ILLUSTRATED
ELECTRICAL REVIEW
A Journal of Scientific and Electrical Progress.

VOL. 30. No. 13. WEEKLY. | NEW YORK, WEDNESDAY, MARCH 31, 1897. | $3 PER ANNUM. Single Copies, 10 Cents.

Copyright, 1897, by Electrical Review Publishing Company, Times Building, 41 Park Row, New York. Entered at Post Office, New York, as Mail Matter of the Second Class.

VIEWS, NEWS AND INTERVIEWS.

A certain central station man ordered a barrel of incandescent lamps from one of the largest manufacturers in the business. The order was filled and the barrel was shipped, marked as follows: "200 16 C. P. Incandescent Lamps 3.6 Watts." On receipt of the shipment the central station man opened the barrel, took out the lamps, and then wrote to the manufacturer that "the 200 lamps have been received intact with no breakage, but we failed to discover the 36 Watts which were supposed to be included in the barrel. Please have this matter traced and forward the Watts to us at once".

The New York Stock Exchange has notified the Western Union Telegraph Company that it will not renew the contract relating to the "Gold and Stock" tickers at the expiration of the existing contract on June 30.

Delegates from unions representing 20,000 steam engineers of New York and vicinity recently held a meeting in New York city and formed the Central Association of Steam Engineers of Greater New York. This was done in order to fight Assembly Bill No. 462, which provides among other things for a State Examining Board for Steam Engineers. The feature of the bill to which the delegates object, provided the bill should become a law, is that, if a man applies to the board to be examined, he can work as an engineer, pending an examination, provided he can secure employment. The delegates say that this would endanger life, by allowing farmers or men of any other trade to work temporarily as engineers. A representative of the association has been sent to Albany to agitate against the passage of the bill.

At New London, Ct., on March 22, James Elliott, Jr., who spat in an electric car, after being admonished by the conductor, was fined $3 and costs in the police court by Judge Butler. This is the first prosecution under the recently enacted anti-spitting law.

The old electric light plant built by John Y. McKane at Coney Island, and which cost the taxpayers of that part of Brooklyn $119,000, was sold at public auction last week for $31,000.

The Brooklyn Bridge Trustees and representatives of the various trolley roads in Brooklyn are trying to agree upon proper compensation to the bridge for the passage of electric cars across it. Superintendent Martin states that 640 round trips are made by the bridge trains, and that 4,706 cars cross the structure each day. The number of men employed in the railroad service on the bridge is 216. It is believed that the scheme of having the trolley cars cross the bridge will result in increased revenue for the bridge.

Alderman Parker, chairman of the railroad committee of the Board of Aldermen of New York city, has made a formal request to the Park Commissioners that they withhold their consent to the change in motive power proposed by the Sixth and Eighth avenue surface railways. Alderman Parker's idea is that if the city would buy the roads, as it has a right to do under their charters, that it could sell them again at an advance of between $2,000,000 and $3,000,000. In the meantime it is expected that Commissioner of Public Works Collis will allow the roads to tear up the streets and begin work at once on the underground trolley system.

New York city will spend for electric lighting during 1897 about $1,250,000. Philadelphia will spend $420,000 for gas lighting and $647,000 for electric lighting. Boston spends in a year about $290,000 for gas and $270,000 for electric lighting. Baltimore's appropriation is about $220,000 a year for gas and $140,000 for electric current. Cincinnati spends in a year $200,000 for gas and $75,000 for electric lights. San Francisco and St. Louis each spend about $300,000 a year for street lighting by gas and electricity. In Brooklyn, N. Y., the expenditure is $160,000 for gas and $360,000 for electric current. Washington, D. C., and St. Paul, Minn., spend about $175,000 each per annum for electric lights. It costs New Orleans about $225,000 per annum for street lights. Buffalo, N. Y., considering its area, is one of the best lighted American cities. It spends $300,000 a year for illumination.

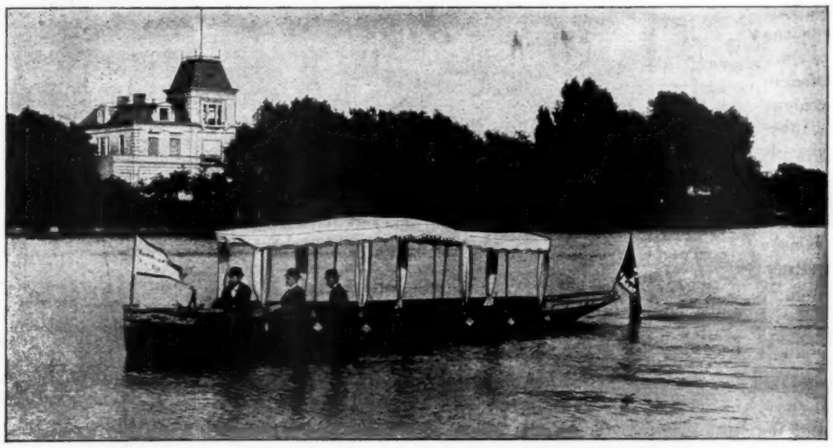


Fig. 1.—Electric Launches in Foreign Waters.

Electric Launches in Foreign Waters.

The popularity of electric launches as passenger-carrying boats was fully established at the World's Fair, and has extended beyond the limits of our country. During the last Summer 10 of this type of boats were in operation at the Berlin Exposition, patterned almost exactly after the type of boat used at Chicago in 1893.

In order to introduce this method of navigation to the German public at pleasure resorts, one of the World's Fair boats was purchased by an enterprising German business man and taken to Hamburg, where it was fitted out with batteries of German manufacture. The launch was there placed on exhibition, and subsequently in regular service on the River Elbe, and will doubtless be recognized in the accompanying illustration. Its evident popularity led to the introduction of the 10 boats referred to, at the Berlin Exposition, where they were a great attraction and a pronounced feature. Each boat was 11 metres in length (about 35 feet), 1.9 metres in width (about six feet three inches), with a carrying capacity of 30 passengers, comfortably seated. This fleet of boats was built and equipped by the Accumulatoren-Fabrik Aktiengesellschaft, the well known manufacturers of the "Tudor" accumulator. This company intends, during the coming boating season, to introduce these boats into passenger service at various Summer resorts, in the same way that the large fleet of World's Fair electric launches have been at many resorts in this country.

Another illustration shows the electric launch used by the referee and judges at Berlin regattas on the River Spree, and in this service the electric launch has proved a great success. It is a boat especially designed for great speed, having a very narrow beam, and is equipped with very powerful electric apparatus, so as to

attain a speed rate of more than 14 miles per hour for 15 or 20 minutes, and is, therefore, able to keep up with any racing crew. The many regattas on the River Spree brought this boat into frequent service last year, and its success may lead to the introduction of boats of this type at some of our college or university regattas. For these details and illustrations we are indebted to Mr. J. C. Chamberlain, of the Electric Launch Company, of New York city, who has recently returned after a visit of several months in Europe.

Mr. Remy's Tesla Coil.

TO THE EDITOR OF ELECTRICAL REVIEW:

Your issue of March 3 contains an article regarding some of my work, which I wish to answer. I agree with Mr. Willyoung that taking metallic objects placed next to plate, after the rays have passed through the body, and taking objects embedded in the body are two different things. When experimenting, to learn the time of exposure, I place objects *on* the body opposite the plate and next the tube. I will now attempt to describe, as Mr. Willyoung suggests, my Tesla coil, which does not have the disadvantage he enumerates. The disadvantages named in the article are:

1. "Tesla coil has at least twice the number of parts—more complex."

This is, of course, true; but in the instrument I use, the high-potential transformer, condenser and Tesla coil are permanently fixed in a permanently closed wooden box, which has not been open since the instrument was made. The terminals and spark-gap are, of course, on the outside of this box.

A machine may be constructed in this way, which is more convenient to operate, as only one adjustment—the length of operating spark-gap—is necessary, and this may be accomplished by simply turning one screw. A machine of this kind, properly designed, is much less liable to damage by use, or jars, or improper handling.

2. "Tesla coil uses oil—not so cleanly."

My coil does not use oil; there are streamers in the box, I suppose, but the machine takes less current than two 16-candle-power lamps, anyway, and the streamers are not hurting the insulation, as the only insulation depended on is space, or air.

3. "Tesla coil requires an operating spark-gap—noisy."

I use about 5,000 or 6,000 volts for Tesla coil primary, and it makes no more noise than a vibrator for induction coil.

4. "Tesla coil produces alternating currents—we get either two foci, and consequent blurring, or reversal of the tubes, and consequent blackening."

Good detail may be obtained with double focus tubes where the foci are close together; but for the very finest work single focus tubes may be made for Tesla coil current; in fact, such tubes can now be bought on the market, but, of course, they take twice the time, other things being equal.

B. P. REMY.

Anderson, Ind., March 23.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.

NEXT GENERAL MEETING TO BE HELD IN MAINE.

At the meeting of the institute, held at 12 West Thirty-first street, March 24, a paper was presented by Dr. Karl E. Guthe on "The Influence of Heat Treatment Upon the Magnetic Properties of Hardened Steel". In the absence of the author the paper was read by Prof. H. S. Carhart, of the University of Michigan, who took part in the discussion together with Dr. Pupin and Mr. Winand.

At the meeting of council in the afternoon the following associate members were elected: Ernest J. Bechtel, superintendent power plant Toledo Traction Company, Toledo, Ohio; Arthur Hillyer Ford, fellow in electrical engineering, University of Wisconsin, Madison, Wis.; Herman L. Holbrow, with New York Telephone Company, New York city, residence Rutherford, N. J.; William F. Kelly, student in expert course, Fort Wayne Electric Corporation, Fort Wayne, Ind.

It was also decided to hold the general meeting of the institute at Greenacre-on-the-Piscataqua, Eliot, Me., beginning Monday, July 26. This date is the 50th anniversary of the entrance of the late Prof. Moses Gerrish Farmer into the field of electricity, which became his life work. Professor Farmer was one of the charter members of the institute, and, in consideration of his high standing as an original investigator and inventor, he was elected an honorary member of the institute October 21, 1890.

His home during the latter part of his distinguished career was at Eliot, Me., and he died at Chicago, May 25, 1893, where he had been engaged in the preparation of his personal exhibit at the World's Fair.

The council nominees for the institute election on May 18, are as follows:

For president—Dr. Francis B. Crocker, of New York city. For vice-presidents—Dr. A. E. Kennelly, of Philadelphia; Charles S. Bradley, of New York city; Prof. Dugald C. Jackson, of Madison, Wis. For managers—Dr. Alexander Macfarlane, of South Bethlehem, Pa.; Gano S. Dunn, of New York city; W. F. C. Hasson, of San Francisco, Cal.; Herbert Laws Webb, of New York city. For treasurer—George A. Hamilton, New York city. For secretary—Ralph W. Pope, New York city.

The officers whose terms have not expired are vice-presidents Charles P. Steinmetz, of Schenectady, N. Y.; Prof. Harris J. Ryan, of Ithaca, N. Y.; Prof. Wilbur M. Stine, of Chicago, Ill.; and managers Charles F. Scott, of Pittsburgh; Bion J. Arnold, of Chicago; Carl Hering, of Philadelphia; Dr. Cary T. Hutchinson, John W. Lieb, Jr., and F. A. Pickernell, of New York city; Prof. Wm. L. Puffer, of Boston, and L. B. Stillwell, of Niagara Falls.

MAKING CALLS BY TELEPHONE.

THE LATEST CHICAGO FAD RAPIDLY BECOMING A REGULAR PRACTICE.

"Hello! Is Mrs. Blank in? No? I'm very sorry. Just leave my name for her, will you please? Mrs. De Caller Smith. Tell her I called, will you? Thanks. Good-by."

"Hello! Is Mrs. Dash in? O, how do you do, Mrs. Dash! This is Mrs. De Caller Smith. I owe you a call, I believe, and I am awfully sorry I did not find it possible to see you before. You see my calling list is growing so terribly enormous. You know how it is, of course. Well, I am awfully glad to see you now."

These conversations, overheard on one of the new "neighborhood 'phones" on the South Side last week, revealed to a surprised listener a new fad—making calls by telephone.

It is "just the very latest thing" among a certain set, and threatens to spread with frightful rapidity over the social world of this city, says a writer in the Chicago *Tribune*.

There is no denying that there are many advantages of the new idea—especially for the telephone company—and the practice is spreading enormously. In fact, it almost appears that the death knell of the already waning modern method of social calls is likely to be sounded by the telephone bell.

The origin of the new fad is, of course, unknown. But it probably was first started by the suggestion dropped by an enterprising agent of the telephone company trying to get people to put in 'phones. When other arguments fail to make the "lady of the house" decide she needs a telephone, he falls back on the original idea: "Why, you want one to talk to your neighbors and friends with. Make your calls by it." Doubtless this saying first put the notion into some emancipated woman's head, or perhaps two or three started at the same time. The rest is the natural course of a fad.

To the woman who has hundreds of acquaintances on her calling list, and only a limited amount of time at her disposal in which to make the visits which fashion decrees necessary, the new system is not half bad. Perhaps over half of her friends have telephones in their houses, and a half again of them are home. The amount of satisfactory calls which can be accomplished by a few hours' devotion to the telephone breaks even the records frequently boasted among the smart set of 34 and 40 calls in a day. And the dressing, discomfort and carriage rides necessary to the average woman are avoided.

The disadvantages of the new style are mainly to the outside world. It is particularly exasperating, for instance, to the groceryman, who is anxious to remedy a mistake in an order before his already late wagon starts, to find a wire busy for 15 minutes in succession. It is also a shock to a man on a "party circuit", who picks up the 'phone in a hurry to call the family physician to a sick child's bedside, to hear: "Ah, but I am positive that it is true. He ran away with her only two days ago, and there is going to be a just too lovely sensation in the church about it," etc. If the listening and impatient man does not interrupt with a remark, a little less than an angelic, he is possessed of great coolness in emergencies.

So fast does the fad grow the telephone companies are contemplating putting on the market telephone chairs of great ease and restfulness, with a support for the arm and plush cushions for the fashionable backs. Special desk instruments for the parlor are also under consideration—instruments which can take their place beside grand pianos and Louis Quinze chairs. So, when my lady is actually receiving the plebeian callers who come in by carriage, she can sit down in all her finery at the 'phone and give a few moments to a dear telephone acquaintance who wishes to tell her what an astonishing number of boxes were vacant last night at the opera.

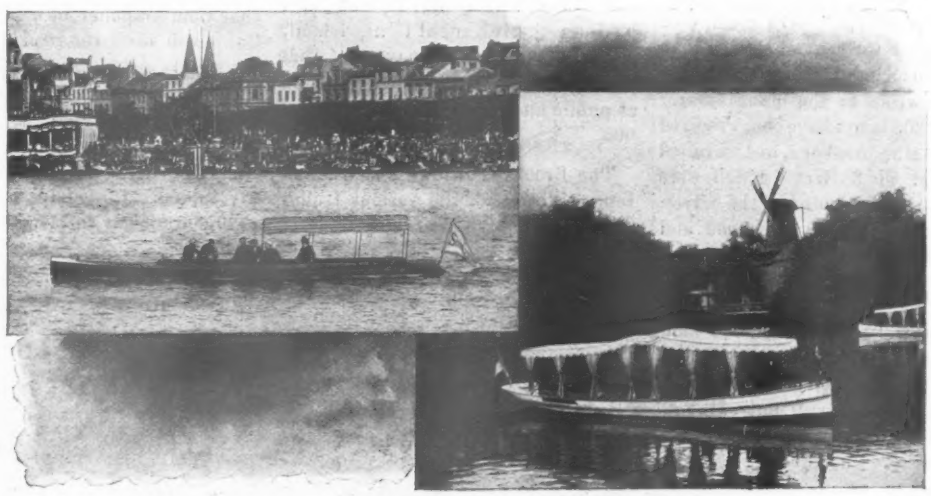


FIG. 2.—ELECTRIC LAUNCHES IN FOREIGN WATERS.

ITEMS OF INTEREST.

Application has been made to the Wisconsin Legislature to grant street railway companies the right of eminent domain in that State.

The Edison Electric Illuminating Company of New York has declared a quarterly dividend of one and one-half per cent, payable May 1. Books close April 14 and reopen May 3.

A bill of complaint was filed in the United States Circuit Court, at Hartford, Ct., on March 24, by the Westinghouse Electric and Manufacturing Company against the New England Granite Company and James G. Batterson for infringement on an electric motor.

The Lynn Incandescent Lamp Company are moving into their new factory in the modern Plant Building, at 685 Washington street, Lynn, Mass., where they will have very greatly increased manufacturing facilities and an excellent suite of business offices on the ground floor. This company devote their energies entirely to the renewal of worn-out incandescent lamps.

President Thomas Sherwin, of the New England Telephone and Telegraph Company, is quoted as saying: "A report has appeared in some of the local papers emanating from New York as to the enlargement of the message business by the telephone companies, especially by the New England Telephone and Telegraph Company. There is no foundation at all for any report of the enlargement of business of this character, and, as far as that goes, there has been no change whatever in the practice of this company in this regard for more than 10 years."

The New England Telephone and Telegraph Company is planning to do about the usual amount of new construction work this year. Among the most important lines that it will build will be one from Machiasport to Calais, Me., a distance of 38 miles. The opening of this line will give the company an unbroken trunk line system from the provincial border through the New England States to the western boundary of Connecticut. Other construction work in contemplation is the rebuilding of the line from White River Junction, Vt., to West Randolph and from West Randolph to Montpelier.

The ELECTRICAL REVIEW has received the "People's Telephone Directory", issued by the Elkhart Telephone Company, of Elkhart, Ind. The list of subscribers is arranged alphabetically, and each page is provided with index letters. The names are printed on the right-hand pages, leaving the left-hand pages blank for memoranda. The Elkhart Telephone Company announces that it has been giving service for 15 months at the regular business rate of $24 per year, and now has over 300 subscribers. Mr. E. C. Bickel is general manager of the company, and Herbert A. Row is superintendent.

Among the more recent applications of radiography, says *Wilson's Photographic Magazine*, is its usefulness in detecting adulterations in drugs and foodstuffs. In the *Annales de Pharmacie*, Dr. Ferdinand Ranwez gives the results of experiments with the X rays to detect impurities in saffron. The plan adopted was to wrap a gelatinobromid plate in black paper, place the saffron on this on the same side as the sensitive film, and allow the rays to act for four minutes, afterwards developing and fixing in the usual manner. The presence of barium sulfate, potassium nitrate, and similar adulterants may thus be sharply indicated in the resulting radiograph.

An official of the Mexican Telephone Company is quoted as saying:

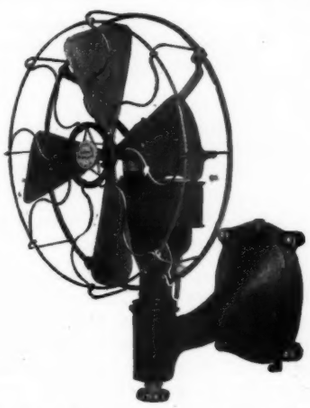


FIG. 1.—WESTERN ELECTRIC COMPANY'S 12-INCH, THREE-SPEED BRACKET FAN.

"The affairs of the company are in good condition. We are more than earning operating expenses. The company now has about 2,400 subscribers, showing a satisfactory increase over last year. Cash on hand is placed at about $6,000. The company is now operating 20 exchanges, the largest of which is at the city of Mexico, where we have 1,000 subscribers. The business of the company the past year has not been quite up to expectations, owing to general business depression. Officials of the company in Mexico say that the silver agitation in United States last Fall adversely affected business conditions in Mexico, and the Mexican Telephone Company was obliged to share its portion of the depression."

European doctors are trying to find out what use can be made of Roentgen rays in the treatment of disease, says the New York *Sun*. No decided results have yet been obtained from the experiments with the rays on the various kinds of microbes, but Professor Loitet, of Lyons, who inoculated two sets of guinea pigs with tuberculosis, found that those exposed to the rays showed no sign of disease, while in the other tuberculosis followed its regular course. Dr. Ausset exposed the abdomen of a seven-year-old girl, afflicted by pulmonary and abdominal tuberculosis, to the rays for an hour daily for three weeks. During that time she improved and gained flesh, but on the treatment being discontinued, through the loss of the apparatus, she grew worse rapidly and soon died.

Western Electric Fan Motors.

If the people, during the hot, sweltering days of Summer, that are as sure to visit us as the tax-gatherer, suffer for want of ventilation, it will not be because of a scarcity of the electric fan motor, with its gentle cooling breeze or draft-producing blast. Among the more prominent concerns who are getting ready for the coming fan-motor campaign, the Western Electric Company seems to have made preparations on a scale equalled by few of its competitors. The company will furnish desk fans, ceiling fans and upright fans in the latest and most efficient designs, so as to meet the demand of the most exacting customer. Their 16-inch desk fan will be furnished with an adjustable stand base, or with adjustable base wall bracket. The same motor is made with rigid stand and rigid wall bracket. The company will also furnish a 12-inch fan with either rigid stand or rigid wall bracket. All these motors will have three speeds, easily controlled by a convenient switch in the base.

The new two-speed ceiling fan, just designed by this company, is especially attractive, not only in design but in points of efficiency as well. The blades describe a circle five feet in diameter; a speed-controlling device and switch are placed in the base of the fan so as to be within easy reach for starting or stopping. The same fan, with slight changes, will be made into a column fan of attractive design, patterns for which are already completed. All of the above-mentioned fans are of the direct current type, and are carried in stock, wound for 110 and 220 volts. Five hundred and fifty-volt fans will

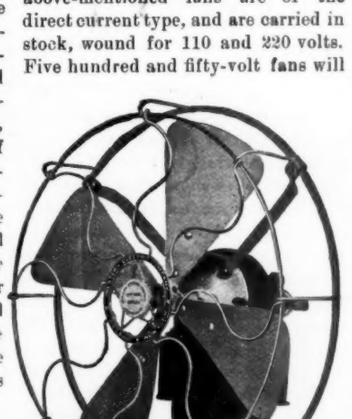


FIG. 2.—WESTERN ELECTRIC COMPANY'S "NEW YORK SPECIAL" 12-INCH, THREE-SPEED DESK FAN.

be furnished to order. These fans are built, we are told, on scientific principles by experts of long experience in that particular line, and will produce the greatest amount of wind for the least expenditure of electrical energy.

One on the Conductor.

[*From "Brooklyn Life."*]

Conductor: I can't use a bill that is torn like this.

Passenger: You might turn that one in to the company.

NEW ELECTRIC LINE FOR CHICAGO SUBURBS.

PROPOSED LINE FROM CICERO INTO THE CITY.

The Suburban Electric Railway Company has asked the Town Board of Cicero for a franchise to build an electric line, or rather two lines from Cicero to Chicago, where it will connect with the Metropolitan L road. The plans of the company provide for two branches. One will run south from Harrison and West Fifty-second streets through Clyde, Berwyn and Hawthorn to Riverside and Lagrange. The other will run west through Austin, Ridgeland and Oak Park to Maywood. Connection with the Metropolitan L will be made at Harrison and Forty-eight streets. The cars will run up an inclined plane, starting at Fiftieth street, until they attain the level of the L, and will run over that line down town and around the loop.

The company first asked for a 10 cents fare, but the town authorities insist on a five-cent trip, so a compromise of seven cents will probably see the Cicero citizens around the loop. The granting of the ordinance would give the people of the western suburbs increased facilities for quickly reaching the heart of the city.

X Rays by Static Electricity.

TO THE EDITOR OF ELECTRICAL REVIEW:

I note in the *Electrical Engineer* for March 24, under the heading "X Rays by Static Electricity", the following:

"A 10-inch spark is sufficient electro-motive force for any purpose, and a six-inch does nicely for all parts of the human body except the trunk."

I believe this statement is very misleading, and will, doubtless, cause many to consider this large spark necessary for the best practical results. Having experimented for several months, endeavoring to produce an influence machine of the highest possible efficiency, I am forced to the conclusion that a discharge of more than six inches in length is absolutely unnecessary; that the question of rapidity, combined with volume of discharge, is of the greatest moment. These conditions can be obtained with very much smaller machines, if run at sufficiently high speed, thus making the apparatus easier to keep in adjustment, more portable, and better proportioned for office use. With such a machine I constantly obtain as fine fluoroscopic views through the trunk as I have yet seen reported. The photographic results are surely as fine as anything I have seen.

Believing that the results obtained are not phenomenal, but rather such as can be obtained by any one with a properly proportioned machine of the size which I have been using, I remain, very truly yours,

E. CATE.

Boston, March 27.

Mr. S. F. B. Morse, the Chicago representative of "Kerite", visited New York city this week.

LITERARY.

The number of *Scribner's Magazine* appearing at Easter time is always particularly bright and attractive, both in contents and illustrations. The April issue this year contains two full-page compositions by Gorguet, called "A Roman Easter"; a portrait by Howard Cushing; the transformation scene in "Dr. Jekyll and Mr. Hyde", by William Hole; Albert Herter's illustration for "Cor Peccatrix", and Gibson's "London", as some of its artistic features.

Beginning with the April number, *McClure's Magazine* will hereafter be published on the first day of each month. April 1 the April number will be on sale on all news-stands and delivered to all subscribers, from the Atlantic to the Pacific; and thereafter, exactly on the first day of each month, a new number will be published. Heretofore publication has been made on the 28th of each month; but it is believed that the change to the 1st will be to the general convenience.

Cassier's Magazine has in its April number, among others, the following articles: "Electric Traction in City Streets," with 23 illustrations of electric street car lines in different cities, by Nelson W. Perry, E. M.; "Ship Building in Great Britain," with eight illustrations of some recently built vessels, by Robert MacIntyre; "The Metric System from a Mechanical Point of View," by Samuel Webber; "An Artificial Ice Skating Rink," with seven illustrations representing general views and details of arrangement, by George Hill.

The *Home Magazine*, Binghamton, N. Y., has taken many strides forward since the price was reduced to $1 a year. The April issue is out bright and early—early as regards time, and bright with respect to the contents. The leading article is on "The Sixth Peary Expedition", by Albert Operti, painter. Mr. Operti has chosen a field for his art in which he is unsurpassed. The illustrations which accompany the article are all original. Another feature of especial interest to traveling men is "The History of Playing Cards", by William F. Gilchrest, the well known New York writer, which is illustrated with novel styles of cards.

A work entitled "A Treatise on Submarine Telegraph Cables: Their History, Construction and Working," has been prepared by Mr. Charles Bright, C. E., F. R. S. E., and will be published by Messrs. Crosby, Lockwood & Son, 7 Stationers' Hall Court, London, provided that a sufficient measure of support can be obtained beforehand. The size of the proposed book is Super Royal 8vo, and it will contain about 600 pages, fully illustrated with drawings and diagrams specially prepared for it. The price to subscribers will be two guineas ($10.30), but after publication the price to non-subscribers will be three guineas. Mr. Bright has been continuously occupied in submarine cable work for over 15 years, so that he is amply qualified from extended experience to deal with the subject from the practical point, while the papers of his father, the late Sir Charles Bright, have provided him with unequaled material for the historical section. Mr. Bright's work contains a complete history of submarine telegraphy, treating the subject from the financial and political, as well as from the technical, side. It deals with the science and practice of cable laying and working in all their engineering and electrical details, including description of the latest improvements in high-speed machine transmission. The subject of insulation is dealt with exhaustively, and the methods of manufacture in producing gutta-percha and india rubber-covered cores are completely described. A valuable feature of the book, too, is the section devoted to patents, in which all master patents are described fully and categorically. The book is one, in short, that an electrical library will scarcely be complete without, while it will especially appeal to the specialist in telegraphy, telephony and insulated wires. Orders for copies may be sent to the ELECTRICAL REVIEW, Times Building, New York city.

We wish to call the attention of our readers to a valuable book recently issued by A. Hartleben, of Vienna. It is by the well known author, Etienne de Fodor, and is entitled "Electricity Directly from Coal". The author, who is thoroughly acquainted with the subject, takes up in the introduction of the work all that has so far been done concerning the direct transformation of carbon into electricity. In order to furnish as complete material as possible, the author starts with the first experiments of Volta. A great many interesting and important facts are recorded, which, up to the present, have been either entirely unknown or have been wrongly reported. For instance: It is shown that Professor Seebeck was by no means the discoverer of the thermo-element, but that 20 years before him Professor Schweiger had pointed out the possibility of constructing a thermo-element, and, indeed, that he not only pointed it out, but constructed one. In the first chapter the author very exhaustively treats of experiments relating to the burning of coal without the application of heat. In the second chapter a number of elements are taken up in which carbon is immersed in molten electrolytes. Chapter IV treats of batteries consisting of oxygen and carbon, and the fifth chapter takes up thermo-elements. In the last two chapters there are a number of interesting and important experiments, several of which have been entirely forgotten, among others the so-called thermo-magnetic generators. If we add, furthermore, that the author makes known the sources from which he draws his information, and that the most important citations are quoted from the originals, it will be seen that this book satisfies a long-felt want in the present electro-technical and electro-chemical literature. The moderate price of the book (three marks) places it within the reach of all students and experimenters.

OUR CANADIAN LETTER.

ROBERVAL, QUE.—An electric light company is being organized here.

RICHMOND, QUE.—Tenders are being received for lighting the town by electricity.

PETERBORO, ONT.—The Peterboro Street Railway will probably be extended this Spring.

BERLIN, ONT.—There is a movement on foot to make the street railway the property of the municipality.

FREDERICTON, N. B.—The New Brunswick Telephone Company is extending its wires from Fredericton to Woodstock, along the St. John River.

SOUTHAMPTON, ONT.—Southampton has carried a by-law to vote $11,000 for the purchase of the Saugeen water power and electric light plant.

SHERBROOKE, QUE.—Mr. Burke, president of the Sherbrooke Electric Street Railway Company, states that the work is likely to be commenced at an early date and to be completed before August.

BROOKEVILLE, ONT.—Tenders will be received by J. W. Holmes, clerk, at his office at Dunnville, for the lighting of the streets of the village of Dunnville by electric arc lights of 2,000 (nominal) candle-power.

HUNTSVILLE, ONT.—Reeve Hutchinson interviewed the Commissioner of Crown Lands at Toronto last week with a view to expediting the passage of the bill to ratify the electric light and waterworks' by-laws.

OTTAWA, ONT.—The Bell Telephone Company, of Canada, has, under date of January 30, presented a petition to the Governor-General, in council, asking for permission to increase its rates.

RICHMOND, ONT.—There is an electric railway scheme on foot to connect Richmond and Bell's Corners, and to connect near the latter point with the proposed line of the Ottawa Electric Railway to Britannia. Power will also be supplied.

INGERSOLL, ONT.—The Ingersoll Radial Electric Railway Company, which is seeking incorporation, proposes to construct an electric railway from Ingersoll to St. Mary's, Telsenburg, Brownsville and other towns. Capital stock, $500,000.

BRIDGEBURG, ONT.—A trolley line is to be built from Bridgeburg, the Canadian terminus of the International Bridge, to the gate of the new Fort Erie Jockey Club grounds, and thence on to the Crystal Beach. It is expected to be in operation before July.

HAMILTON, ONT.—At a meeting of the shareholders of the Hamilton & Ancastor Radial Railway, a resolution was passed to obtain the necessary powers from the legislature to extend the road to Brantford. The cost of the extension is estimated at $200,000.

CHELMSFORD, ONT.—The Mineral and Timber Electric Railway applies for an Ontario charter to build a line from a point between Chelmsford and Surgeons Falls to Lake Wahnapetac, and to James Bay on the North and Lake Huron, near Killarney, on the South.

HALIFAX, N. S.—The Halifax Tramway Company realized a profit of $27,000 in the last six months, but a dividend was not declared. H. W. Whitney, president, and J. Y. Payzant and David McKeen, vice-presidents, were re-elected. The extension was let over until next Spring.

SHERBROOKE, QUE.—The Sherbrooke Electric Street Railway has let a contract for 500 poles, 200 of which the contractor will begin to deliver at once. The road will be finished for traffic to the exposition grounds by July 1, and the entire system in running order for August.

OTTAWA, ONT.—The annual report of the Ottawa Electric Railway Company shows Ottawa's progress. The total number of passengers carried by the Ottawa electric cars in 1892 was 1,520,405, with receipts of $71,-698. In 1896 the number carried was 4,583,235, with receipts of $212,105.

HALIFAX, ONT.—A bill is now before the provincial legislature to incorporate the Halifax & Bedford Electric Company, for the purpose of operating an electric tramway and supplying electric power. The capital stock is to be $300,000. W. E. Crowe and A. E. Sullis are among the promoters.

ROSSLAND, B. C.—Messrs. J. R. Mitchell, of Vancouver; L. H. Webber, of Rossland, and P. C. Stoess, of Spokane, are applicants for incorporation as the Okanagan Water Power Company, with power to construct and operate a system of electric power and lighting plants at Dog Falls, on the Okanagan River.

VICTORIA, B. C.—The following companies are seeking incorporation: The Okanagan Water Power Company; South Kootenay Water and Power Company; Revelstoke Waterworks, Power and Electric Light Company, of Revelstoke; Fairview Power, Water and Telephone Company, and the Revelstoke, Trout Lake & Big Bend Telephone Company.

CHATHAM, ONT.—The Chatham City & Suburban Electric Railway will apply for an Ontario charter to extend its lines to Rondeau, thence to Blenheim and Charing Cross, also to Wallaceburg and Petrolea. Chicago money is to build the Chatham City & Suburban line if the city will guarantee $200,000 of the company's four-per-cent bonds for 20 years, in return of a lighting service of 100 lamps.

J. A. C.

Montreal, March 27.

The earnings of the Metropolitan Street Railway Company, of New York city, are said to be showing a gain over last year equal to about $40,000 per month.

The Backus Electric Fans.

The Backus Water Motor Company, of Newark, N. J., are the manufacturers of the electric fans illustrated herewith. In Fig. 1 is shown a sectional view of the two-speed motor used to operate these fans. The construction of the motor itself, blade-holder, oiling device and bearing may be plainly seen. The shaft is of hollow steel, through which the rod, which is always stationary, passes. This rod connects with a button at the bottom and with a switch at the top. By turning the button at the bottom the fan is stopped or started and made to run fast or slow. There is but one long bearing which runs in grease, which is put in when the fan is made and will not melt or drip. No oil is required. The commutator is made of the best tempered copper and the brushes are of imported carbon, feeding automatically to the commutator. The principal points of advantage claimed for these motors are the two separate speeds, economy in current consumption, high-class construction,

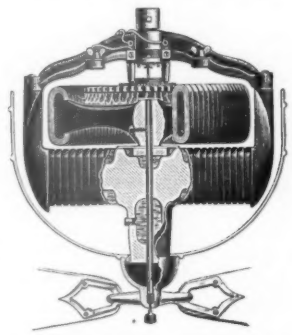


FIG. 1.—TWO SPEED MOTOR USED WITH BACKUS ELECTRIC FANS.

durability, and the fact that no attention is required.

In Fig. 2 is shown the Backus type of ceiling fan, which may be furnished with or without lights. This fan is finished in polished brass, full nickel, oxidized silver and old ivory and gold.

To meet the demand for a high-class column fan for use in dining rooms, the type shown in Fig. 3 has been designed. Attached to it are coat hooks and an umbrella stand, if the customer so desires.

Water-Power Development in California.

Filings were made at San Bernardino, Cal., on March 14, 1897, by John L. Campbell, acting for W. A. Campbell, of Minnesota, on 3,000 miners' inches of the waters of Lytle Creek for the purpose of developing power for electrical purposes. A dam is to be built, and the waters led down in steel pressure pipes until a fall of about 700 feet is obtained. The power house will be situated just above the point of diversion by the irrigators—about 10 miles northwest from San Bernardino.

At the annual meeting of the Longmont Electric Light and Power Company the following directors were elected: D. C. Donovan, J. H. Jones, Wm. Neeley, F. H. Stickney and J. W. Turrell.

Queens County Railway Company.

It is reported that R. T. McCabe, president of the New York & Queens County Railway Company, which owns all the trolley lines in Long Island City, N. Y., will retire in a few days, to be succeeded by Mr. Shelmerdine, of Philadelphia. That

FIG. 2.—BACKUS CEILING FAN.

gentleman and a few friends have secured a controlling interest in the company, and contemplate many changes in the system, including an extension of its lines to distant points in Queens County, bringing the trolley in direct competition with the Long Island Railroad. George Chambers, who has been general manager of the system for three years, will be succeeded by J. R. Beetem, until recently general manager of the Union Traction Company, of Philadelphia. When Mr. Chambers took hold of the system there were only 26 miles of track and sufficient electrical equipment to operate 28 cars. Now the company has 60 miles of track, 180 cars, two large power houses, new machine shops, car sheds and depot.

FIG. 3.—BACKUS COLUMN FAN, WITH COAT HOOKS AND UMBRELLA STAND.

Why Should Contractors for Electrical Appliances Sell Steam Engines?

TO THE EDITOR OF ELECTRICAL REVIEW:

In the following I wish to prove a great mistake dynamo builders and contractors are committing by furnishing engines for dynamos.

When a set of specifications for an electric light plant are drawn up, the engineer sends it to a contractor of electrical apparatus, to submit him a bid. In nine cases out of ten those specifications call for a dynamo, an engine, erecting of same, as well as foundations. It may often happen that the engine part, including its foundations, is the biggest part of the contract, so the dynamo man, if he wants his bid considered, must take the responsibility of the engine dealer, though he is no more a dealer in engines than the engine man is in dynamos. Of course, the dynamo man protects himself by receiving the same guarantee from the engine man as he sets forth in his bid, but in many cases he has to go beyond that, so as not to lose the sale of his dynamo.

The plant is now installed, and, after being set in operation and proved to be defective, the trouble is found to be with the engine. The dynamo man is notified (not the engine man, for he is not known in this transaction at all, though he has made the most money out of it). He at once puts himself in communication with the engine man, whose factory, perhaps, is thousands of miles away from where the plant is erected, and explains the existing trouble, after first, of course, having tried what local assistance he could get, as well as assuring the purchaser that the trouble is only a momentary one; after a good deal of letter writing and telegraphing has been indulged in, the engine man has proved (though, as said, thousands of miles away) that the trouble in the engine is due to its careless erection, as you have very likely sprung the shaft by putting on the armature, or your foundation is not heavy enough, or, perhaps, something has happened in transit and the engine was sold at purchaser's risk. The consequence will be that the man who tried to sell a dynamo is undergoing considerable trouble, can not get his bills paid, and, perhaps, having his reputation impaired, and all because he had to sell an engine on which he did not realize a cent.

The dynamo builder does not feel this evil as much as the electrical contractor, though often is he called upon to furnish the set. And why should a dealer—a contractor of electrical appliances—furnish engines any more than he should furnish boilers and pumps? I once asked a well known manufacturer of dynamos for a price on a direct-connected set—dynamo and engine. He wisely told me "he only sold electrical apparatus; he was no trader".

I will admit, when the armature is fastened to the shaft, it becomes a direct part of the engine; but is it not turned to a certain size—and that within a thousandth part of an inch—and is not the engine shaft turned the same way in the engine shop? So, if a bad fit should exist, it is a small matter to prove whose fault it is and keep that party responsible for it. It is easily understood that the purchaser would like to keep one man only responsible for the outfit, but if he was made to understand that he could not buy steam engines from electricians, he would have to buy them where they should be bought; viz., from dealers in engines.

I have here only mentioned the direct-connected set, as I think it is but a question of short time before the belted dynamo will disappear, and I hardly think it necessary to discuss the folly of having to furnish the engine for a belted dynamo.

I should like to have the co-operation of others in this matter, and hear their opinion, as I, for one, do not think that the electrical contractor should furnish steam engines any more than the carriage-maker should furnish horses. CHARLES LEVEN.

New Orleans, March 19.

Electrical Review

Times Building, 41 Park Row,

P. O. Box 2329. NEW YORK.

EDITOR:
CHARLES W. PRICE.
ASSOCIATE EDITOR:
STEPHEN L. COLES.

REGISTERED CABLE ADDRESS:
"ELECTVIEW," NEW YORK.

1546 "CORTLANDT," TELEPHONE CALL.

WESTERN OFFICE:
CARL E. KAMMEYER, Representative,
1627 MONADNOCK BLOCK, CHICAGO.

LONDON OFFICE:
HENRY W. HALL, Representative,
42 OLD BROAD STREET, LONDON, E. C.

News, Subscriptions and Advertisements.

Subscription to the
ELECTRICAL REVIEW.

One Year, United States and Canada, - $3.00
One Year, Foreign Countries, - - 5.00
Single Copy, - - - - - - .10

Copies can only be supplied for one year back at 25 cents each.

Special Notice to Advertisers.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue.

NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, MARCH 31, 1897.

CONTENTS.

	PAGE
Views, News and Interviews	145
Electric Launches in Foreign Waters	145
Mr. Remy's Tesla Coil	146
American Institute of Electrical Engineers	146
Making Calls by Telephone	146
Items of Interest	147
Western Electric Fan Motors	147
One on the Conductor	147
New Electric Line for Chicago Suburbs	147
X Rays by Static Electricity	147
Literary	148
Our Canadian Letter	148
The Backus Electric Fans	149
Water Power Development in California	149
Queens County Railway Company	149
Why Should Contractors for Electrical Appliance Sell Steam Engines?	149
Has *The Sun* Been Bamboozled?	150
The Late John M. Orford	151
Bliss Armature-Disk Cutting Press	151
Kind Words	151
Street Railway Traffic in New York City	151
Brooklyn Elevated Railroad To Be Reorganized	151
Personal	151
Telephone News and Comment	152
Electric Railway Notes	152
A Seashore Electric Railway	152
Street Railway Accountants Form an Association	153
Westinghouse Motors Wanted	153
The Rowand Automatic Cutout for Trolley Lines	153
Inefficiency of Volunteer Fire Departments	153
Chicago News Notes	154
Bullock Electric Company	154
The Influence of Heat Treatment upon the Magnetic Properties of Hardened Steel	154
Advance Information	156
General Notes	156
Kindred Interests	ix
Electrical Patents	x

INDEX OF ADVERTISERS.

COVER PAGES.

	PAGE
Abendroth & Root Mfg. Co., boilers	xvi
American Electrical Works, insulated wire	i
Bogart, A. L.	i
Bristol Co., recording voltmeters, etc	i
Bunnell & Co., J. H., dry batteries	i
Crefeld Electrical Works	i
Crocker-Wheeler Electric Co	i
Day's Kerite, insulated wire	i, viii
Diehl Manufacturing Co	ii
Eastern Electric Cable Co	xvi
Electric Appliance Co., supplies	i
Fort Wayne Electric Corporation	xvi
Goubert Manufacturing Co	xvi
Greeley, The E. S., & Co., electrical supplies	i
Imperial Porcelain Works	xvi
Interior Conduit and Insulation Co., Lundell dynamos and motors	i
Iron Clad Rheostat Co	i
Jewell Belting Co	xvi
National India Rubber Co	i
New York Insulated Wire Co., Grimshaw wires and cables	i
Okonite Co., insulated wire	i, xvi
Peckham Motor Truck and Wheel Co	xv
Rodrigues, M. R.	i
Safety Insulated Wire and Cable Co	i
Standard Paint Co., insulating compound	i
Standard Underground Cable Co	i
Stirling Co., water-tube boilers	xvi
Thayer & Co	i
Van Nuis, C. S	i

INSIDE PAGES.

Adams-Bagnall Electric Co	v
American Bell Telephone Co	xiii
American Electric Heating Corporation, electric stoves and car heaters	xiii
American Electric Telephone Co., long-distance telephones	xiii
American Engine Co	viii, xii
Automatic Circuit Breaker Co	x
Baker & Co., platinum	v
Beacon Lamp Co., incandescent lamps	x
Belknap Motor Co	xii
Biddle, J. G.	xi
Brill, J. G., Co	v
Brixey, W. R., Day's kerite wires and cables	viii
Brush Electric Co	viii
Bubier Publishing Co	xii
Bullock Electric Mfg. Co	xiv
Connecticut Pipe Mfg. Co	xiv
Central Electric Co., electrical supplies	iii
C. & C. Electric Co	vi
Clonbrock Steam Boiler Co	iii
Coles, Walter S	x
Carborundum Co	viii
De Veau & Co	xii
Dixie Company	x
Dixon, Jos., Crucible Co., belt dressing	v
Duval, E. S., Jr., patents	x
Dyer & Driscoll, patent solicitors	x
Eastman Kodak Co	x
Edison Mfg. Co	xi
Electrical Mercantile Agency	ix
Electric Launch Co	ix
Elwell-Parker Electric Co. of America	xii
Empire China Works, porcelain specialties	v
Eppenger & Russell Co., Valentine subway electrical conduit	v
Equitable Life Assurance Society of the U. S	xiv
Faraday Carbon Co., carbons	viii
Forest City Electric Co	xi
Globe Electric Heating Co	vi
Green & Bauer	xi
Hampson, E. P., & Co., engines	xii
Hemingray Glass Co	viii
Hill, Jr., Thomas	x
Hill Electric Co., W. S	xi
Hoopes & Townsend	iii
Huebel & Manger	ix
Hunter Fan and Motor Co	vi
India Rubber and Gutta Percha Insulating Co	v
International Correspondence Schools	ix
Knott, L. E., Apparatus Co	xi
Leffel & Co., Jas	viii
Lehigh Valley Creosoting Co., creosoted lumber	xii
McCaskey & Holcomb	ix
Manhattan Electrical Supply Co	vi
Marshall, Wm., condensers	ix
Metropolitan Electric Co	xiii
Mianus Electric Co	xiii
Midland Electric Co	iii
Murdock & Taber	xiii
New England Engineering Co	vi
New York Telephone Co	xii
Novelty Electric Co., supplies	vi
Orient Electrical Co	x
Ostrander, W. R., & Co., supplies	x
Partrick & Carter Co., electrical supplies for housework	x
Pettingell-Andrews Co	iii
Phillips Insulated Wire Co., wire	viii
Ritchie & Sons, E. S	xi
Royce & Marean, electrical supplies	ix
Sessions Foundry Co	xiv
Siemens & Halske Electric Co. of America	iii
Solar Carbon and Manufacturing Co	vi
Spring Park Laboratory	xi
Standard Thermometer & Electric Co	v
Utica Electrical Mfg. & Supply Co	ix
Viaduct Mfg. Co., telephones, etc	xii
Wanted	x
Wedderburn & Co., John, patents	x
Western Electric Co	v
Western Telephone Construction Co	xiii
Westinghouse Electric & Mfg. Co	xiv
Weston Electrical Instrument Co., measuring instruments	viii
White-Crosby Co., contracting engineers	x
Whitney Electrical Instrument Co	ix

In the death of Mr. John M. Orford, assistant general manager of the Boston Electric Light Company, the electrical fraternity loses a valuable member. He was an able electrician, a man of executive ability, and a gentleman of sterling integrity. The ELECTRICAL REVIEW extends its sympathy to his family and his friends on his untimely death.

HAS "THE SUN" BEEN BAMBOOZLED?

The Sun on Sunday last published a long interview with a wind-engineer, who first poses as an expert at large, and then gives it away that he is interested in the promotion and introduction of the very air-motor discussed. His position being earmarked in such fashion, of course his criticisms of electric systems have no value whatever. Still it is interesting to weigh them, as also the boosts he gives the air-motor. The interview is chiefly directed against the underground electric railway system as now in operation in this city and about to be extended.

The article in question begins with an attack based upon alleged disturbance of gas and water pipes, destruction by electrolysis, malarial exhalations, etc. Facts are that no electrolysis occurs with a well built underground trolley system, as the circuit is metallic and ground leakage is absent. In any new system the old flat rails must be replaced with the modern girders and substantial bed to permit rapid transit, and this would be necessary in this city even if compressed air motors were adopted. Hence, in any case, tearing up streets and its attendant temporary annoyances can not be avoided.

The same engineer says at one point: "Any grade can be overcome by an air motor that can be surmounted by a steam locomotive"; and at another, "the weight upon the wheels of the air motor is only half as great as on the drivers of an ordinary locomotive". Has he discovered a new kind of adhesion which only applies to wheels driven by air? Seems so.

He says air motors are more completely under control than any other, and can be stopped instantly. This is a new sort of inertia enabling the motorman to "whistle down the wind" and dissipate the gathered energy of a heavy car going 10 miles an hour.

He says there is no loss in transmission with compressed air, and then admits loss in compression, which is but the transmission from compressor to reservoir. The loss in compression, he says, is regained nearly by reheating before use, but carefully guards against admitting that such reheating requires more fuel and therefore power and expense.

The whole article is full of misrepresentations and suppression of governing facts. The trolley system, whether overhead or underground, affords complete independence of motors, allows time schedules to be maintained, requires no more power than air, is cheaper in the long run, more reliable and satisfactory in general operation, and will continue to have the preference of those who conservatively administer the affairs of large municipal systems of surface railways. The electric system is here, and will stay. The air system has been struggling for years, has been exploited time and again and always fails for the same old reasons—high cost of operation, small return in average available power, dangers of high-pressure reservoirs, and general unreliability in the operation of a large system. The electric system has had all these and other difficulties to surmount, has met the case squarely, has been generally adopted to an unparalleled degree, has proved itself the wonder of the world, and aspersion can not dislodge it nor persuade railway managers to substitute or adopt a wind-bag.

Compressed air always has been, and will be, subject to the same objections. High-pressure tanks are dangerous, and the machinery of compression—storage and utilization—is of a more delicate character than the rugged types now used with electric power. Expansion of high-pressure air will produce great cold, whether such air is dry or moist, and, in a moist atmosphere, will produce its inevitable results.

The whole article in *The Sun* is fallacious, and but an attempt to advertise a particular air motor. One of its arguments is a boomerang. It says, "To overcome a given resistance, precisely the same amount of power is required, whatever may be the system", and thereupon the writer proceeds in an unsuccessful attempt to prove that the air system takes less power than the electric. But a given car on a given track at a given speed requires the same number of foot-pounds, no matter what system is used—air, electric, cable or mules—and it can never be otherwise.

It may be regarded as a controlling proposition that in a system like that of the Metropolitan Street Railway Company there can be but one reason for the rejection of any proposed new system, namely, that whatever be its merits they are overshadowed by the superior merits of the system actually adopted. They are about as keen after the "nimble sixpence" as any one can be, and may be depended on to adopt only that system which best responds to their exacting requirements as to durability, reliability, ease and cost of operation and maintenance; and they are not likely to be hoodwinked in their selection in so grave an expenditure.

Compressed air has its uses, and its field is a wide one indeed, if legitimately cultivated, and it is too bad to see the subject so maltreated in one of our leading metropolitan newspapers.

THE LATE JOHN M. ORFORD.

BY CAPT. WM. BROPHY.

John M. Orford, assistant general manager of the Boston Electric Light Company, died at his residence in Jamaica Plain, Mass., on the morning of March 23, 1897, after an illness of nine days.

The sad news of Mr. Orford's death will be read with feelings of profound regret by all who ever had the pleasure of his acquaintance, as well as his near friends and acquaintances. Enemies, he had none; to know him was to be his friend for life, for he was a pleasant companion and a steadfast friend, ever ready to extend friendly greetings and heart-felt sympathy, and more substantial tokens of his good will to those in need. He was a loving husband and a kind and indulgent father. He leaves a widow and five children to mourn his loss, which, to those who knew them and him, seems irreparable.

His funeral, which occurred on the 26th inst., was from his late residence, and was largely attended by his friends and business associates, among whom were the officers and directors of the Boston Electric Light Company and nearly all the employés, the commissioner of wires, and a large delegation of the employés of the Boston wire department, representatives from the Bridgeport and New Haven electric light companies, the General Electric Company, and a large number of representative electrical men and other friends. The remains were interred in Forest Hills Cemetery, near Boston.

John M. Orford was born in Fifeshire, Scotland, October 26, 1843. He was graduated from the Royal School of Engineers at Chatham and Sandhurst, England. He then entered the service of the British Government, where he was soon given charge of the electric telegraph in Persia. Some twelve years ago he left the government service and engaged in commercial business in England for a few years. He came to the United States in 1880.

He was connected with the Brush Electric Light Company, of Baltimore, for a few years, and from there went to Bridgeport, Ct., where he occupied the position of general manager of a lighting company until 1892, when he resigned to accept the position of assistant general manager of the Boston Electric Light Company, which position he held at the time of his death.

We are indebted to Mr. P. H. Alexander, another of Mr. Orford's many friends, for the following particulars of his early career in foreign lands:

"When the Indo-European Telegraph Company was established, Mr. Orford applied for a foreign appointment. He passed so successful an examination that he was appointed a telegraph inspector in Persia, with headquarters at Teheran. Among his operators were (since knighted) Sir Henry Mance, now president of the British Institute of Electrical Engineers, and J. F. Mills, of London, now superintendent of the Direct Spanish Telegraph Company. From Persia Mr. Orford was transferred to India, where he married, and his two oldest children were born. During the terrible famine, 18 years ago, his wife was so affected by the horrible scenes surrounding her that she died from a broken heart, and he fled the country with his two children and a native nurse, making the journey overland through Russia and Germany. He sought employment in England, and, marrying again, came to America with letters of introduction to the Western Union Telegraph Company. His connection with them was of short duration."

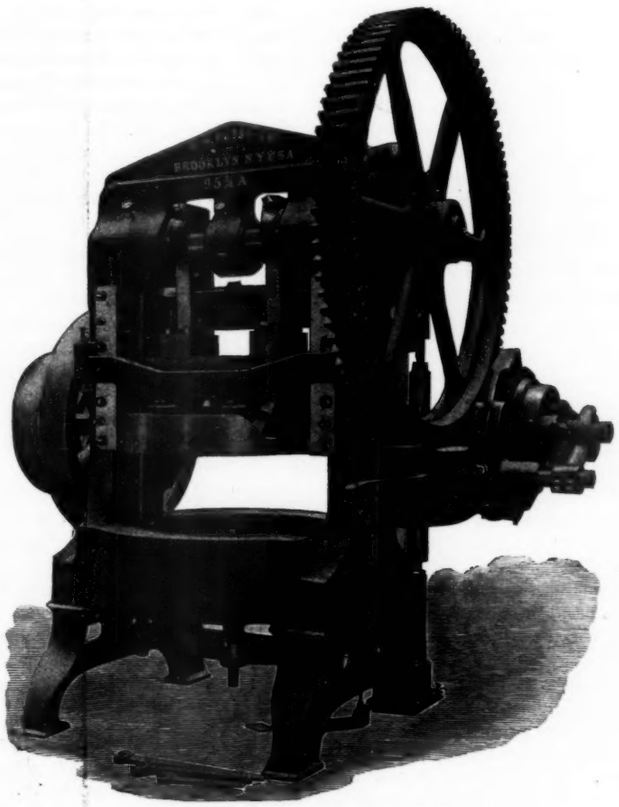
Bliss Armature-Disk Cutting Press.

The requirements of armature work for electric motors and dynamos have led to the construction of presses which differ in essential points from those used for other styles of sheet-metal work.

The usual form of armature is made up of annular disks with notches on the outside or inside circumference. As it is essential to have the outside and inside exactly concentric, it has been found best to adopt dies which, by cutting them simultaneously, eliminate the inaccuracies which are almost unavoidable when the cutting is done in two or more operations. In many cases the notches and key-slots are also punched at the same time, all of which call for tools having "throwout pads" in addition to the cutting parts, so as to automatically push the disks and scrap out of the dies and punches.

These "throwout pads" are now usually operated by means of heavy springs, which are not always reliable, and consume a great deal of the power of the press. The press shown herewith is designed to operate these "throwouts" in a positive manner, and consume but little of the power of the press.

The bottom plate, which operates the "die pads" through radial slots or pin-holes in the bolster, is actuated by an outside crank connection, or by means of two rods connecting it directly with the slide, as shown in the illustration.



BLISS ARMATURE-DISK CUTTING PRESS.

Two cross-pieces, adjustably attached to the frame of the press, actuate the "throwout pads" of the punches by striking against them on the return motion of the main slide.

This press is designed for the class of work mentioned by E. W. Bliss Company, 41 Adams street, Brooklyn, N. Y. It will cut the outside and inside simultaneously on plain disks up to 31½ inches diameter and up to 14 or 15 inches diameter, when all the outside notches are also to be cut at the same stroke. It may also be used for cutting segments or sections complete at one stroke with all their teeth or holes up to 31½ inches long.

KIND WORDS.

"ABOVE THE AVERAGE."

TO THE EDITOR OF ELECTRICAL REVIEW:

Since I have become a subscriber to your journal, I have found it a valuable paper and above the average electrical publications. S. W. L.

March 29.

Street Railway Traffic In New York City.

A gentleman, who is largely interested in city railways, is quoted by the *Wall Street Journal* as follows: There are about so many passengers to be carried in New York daily, and the annual increase is not so great as many people imagine. Heretofore, Manhattan has had little competition south of Twenty-third street, but this it will have as soon as the Fourth, Sixth and Eighth avenue lines are equipped with the underground trolley.

This short travel, which pays so well, will go to the surface roads. Manhattan, if it changed its motive power, should extend its lines to reach points which it does not touch now, and then it would develop new business. The electrical lines figure that a car running from the Harlem River to the Battery will be filled in that distance, four times, because of travel for short distances. This is the experience, and it certainly would not pay to run cars that distance for one fare.

Brooklyn Elevated Railroad To Be Reorganized.

Justice Van Wyck of the Supreme Court in Brooklyn, N. Y., on March 25 appointed president Frederick Uhlman receiver of the Brooklyn Elevated Railroad Company. The action was taken on the application of the Central Trust Company, of New York city, which has begun proceedings to foreclose mortgages held on the Brooklyn Elevated Railroad Company, the Union Elevated Railroad Company and the Seaside & Brooklyn Bridge Railroad Company. The action is a friendly one, and was in pursuance of a reorganization agreement which has been issued by the Central Trust Company. The Brooklyn Elevated Railroad Company owes taxes amounting to $322,000. The syndicate formed to reorganize the system will provide for future train connections across the New York & Brooklyn Bridge.

PERSONAL.

Mr. James F. Cummings, president of the Armorite Interior Conduit Company, of Detroit, Mich., has returned from an extended trip through Canada.

The following out-of-town visitors registered at the office of the National Electric Light Association, No. 136 Liberty street, New York city, during the week ending March 26: Jas. I. Ayer, Boston, Mass.; G. L. Kimball, Washington, D. C.; G. W. Hart, Hartford, Ct.; J. Mustard, Philadelphia, Pa.

Mr. Charles J. Glidden, vice-president of the Southwestern Telephone and Telegraph Company; E. K. Baker, general superintendent, and Frank B. Knight, special agent of the American Bell Telephone Company, recently visited Galveston, Tex. Considerable improvements have recently been made in the Galveston plant, and others, affecting long-distance connections, are contemplated.

TELEPHONE NEWS AND COMMENT.

The New York Telephone Company has at the present time 17,500 subscribers, from whom it receives in rentals about $2,625,000 per annum.

At a meeting of the directors of the New England Telephone and Telegraph Company, of Boston, Mass., held March 24, 1897, a dividend of $1.25 per share was declared, payable May 15, to stockholders of record at the close of business, April 1. The transfer books will be closed April 2 to May 3, both days included.

The New York State Telephone Company has elected the following officers: President, Hon. I. J. Evans, Rome; vice-president, George McClumpha, Amsterdam; secretary, E. E. Summy, Buffalo; treasurer, William Clark, Fort Plain. The officers, with Willis E. Devendorf and Judge J. D. Wendell, of Fort Plain, and Frederick Englehart, of St. Johnsville, constitute the board of directors.

The telephone has shown itself such an efficient aid to commercial operations that it is now found to be a serious obstacle in the way of railway development in many parts of the country, and especially so between large cities within an easy distance of each other. It is a significant fact that the January passenger earnings of the New York, New Haven & Hartford Railroad were five per cent less than for the same period of 1896.

The bill introduced by Mr. Butler, in the United States Senate, on March 19, provides that the Post Office Department shall build a postal telegraph system, construction to be of the best possible, and to be done by the lowest bidder, after proper advertising all over the country. Work is to be pushed until every town in the United States of over 400 inhabitants shall have been connected with wires of the postal-telegraph system, and, later on, every post office of the United States. The Postmaster-General may purchase any existing telephone or telegraph system, provided that the amount asked and paid shall not exceed the lowest price at which the government could construct its own lines. Provision is made for the management of the system by postmasters, and telephones may be used wherever they will save expense. The rates shall be 10 cents for 10 words, exclusive of address and signature, and five cents for each additional 10 words, or less. Press messages shall go at a rate not exceeding 20 cents for 100 words, and entirely impartially. Postal telegraph stamps shall be issued for convenience.

A new and cheaper telephone system is about to be introduced into the residence portion of Buffalo, N. Y., by the Bell Telephone Company. The new system is known as the Barrett selective system. It was patended last December by its inventor, one of the electricians of the Long-Distance Telephone Company. The Bell Telephone Company, of that city, is the first to order the new system, for which it has ordered apparatus to be used in connection with its branch offices. It is expected that the company will soon begin contracting for telephones under the Barrett system, the apparatus being almost ready for use. Subscribers connected with the branch offices will be given their choice as between the new and the old systems. Whereas the lowest present rate is $30 per annum for 300 messages, the subscriber to the new system will be entitled to 400 messages for $24 per annum. Each subscriber will have a long-distance telephone operating on metallic circuit lines. The multiple ringing of bells is obviated. Another advantage claimed for the new system is that it does away with eavesdropping. A disk indicates whether the line is free or in use, and among the other merits of the invention are saving of time in making connections and an ingenious arrangement of switchboard.

In the suit of John McGorty against the Southern New England Telephone Company, the plaintiff was awarded nominal damages in the sum of $5 and costs. Suit was for $20,000 damages, and was tried a month ago in the Superior Court of Fairfield County, at Danbury.

McGorty was a lineman in the employ of the telephone company—one of the gang engaged in rebuilding the lines of the company in Danbury. On December 12, 1895, while McGorty was working at the top of an old pole removing the wires and cross-arms preparatory to taking down the pole, the pole suddenly broke at the base and toppled over, throwing McGorty to the ground and breaking both knee pans. He was treated for 18 weeks at the Danbury Hospital at the expense of the telephone company. After his discharge from the hospital he brought suit against the telephone company, claiming that the company was negligent in not having tested the pole before sending him to work at the top. The company defaulted and the case was tried on a hearing in damages before Judge Robinson.

On the trial the company maintained that it was the duty of McGorty and his fellow linemen in the gang to inspect old poles before climbing them; that they were the only employés of the company competent to test poles, and that McGorty understood and accepted the risk of any weakness or rottenness in the pole.

In allowing McGorty only nominal damages of $5, the court held that the telephone company was not responsible for the accident and injury.

At the annual meeting of the Warren, Pa., Street Railway Company, W. Beatty was elected president, and the following gentlemen were elected to serve as directors for the ensuing year: D. H. Sigging, W. A. Rankin, Wm. Lavery, Dr. Hepburn and J. D. Woodard.

ELECTRIC RAILWAY NOTES.

Those who advocate the use of double-decked trolley cars claim that their earning capacity exceeds that of two of the ordinary type. The Pullman company at the present time is building a number of cars of this style.

The Electric Storage Battery Company, of Philadelphia, has received an order from Receiver Condict, of the Englewood & Chicago Street Railway, for the equipment of 20 cars, at a contract price of $87,000. This certainly looks as if the storage battery is to be given a thorough trial for traction purposes.

Judge Showalter has entered an order giving the receiver of the Englewood & Chicago, Ill., Street Railway the right to issue $265,000 receivers' certificates, to be known as Series B. Of this amount, $87,000 will be paid over to the Electric Storage Battery Company, of Philadelphia, in payment for batteries with which to equip the road.

In regard to the statement that the plans for the equipment of the Manhattan Elevated Railway in New York city with electricity have been abandoned for the present, president George J. Gould is reported as saying that it is not true. He is studying the subject all the time, and is as much of an enthusiast about electric motive power as ever.

The Alley "L" road, of Chicago, will probably be the next one to use the union loop, the connection on Harrison street requiring only half a block of double track and two double curves in order to reach the loop in Wabash avenue. It is stated that the directors are again looking into the merits of electric traction with a view of adopting it.

It is reported that the Consolidated road intends to erect an electric power station at Campville, Ct., on the Naugatuck division, to operate all-way passenger trains between Waterbury and Winsted. The early morning train to New York will probably be run through by steam, as will also the freights, but all others will be equipped for electricity.

The Waldran Automatic Brake Handle Company, of St. Louis, Mo., recently gave a trolley ride to the Meramec Highlands, the object of which was to permit street railroad operators and manufacturers of apparatus to inspect and test the merits of the Waldran automatic brake handle. Refreshments were served en route, and a luncheon was given at the Highlands. The occasion was a very enjoyable one.

The New York & North Shore Railroad Company, incorporated recently, has made application to the Board of Highway Commissioners at Flushing, L. I., for a franchise for a trolley railroad through Flushing to Manhanset, Whitestone, Bayside and Jamaica. The commissioners will call a meeting of the citizens, in Literary Hall, on April 3, to sound public opinion in the matter. Sentiment toward projected lines is thought to be favorable.

The board of directors of the East Pennsylvania Traction Company has called a special meeting of stockholders, May 17, to take action on the proposed increase of capital stock from $350,000 to $1,000,000, and to act on the proposed increase of indebtedness by borrowing money, not exceeding $1,000,000, and issuing bonds therefor, securing payment of bonds by mortgage. This money, it is thought, is for the purpose of extending the road from Newton to Doylestown, Pa., about 34 miles.

The directors of the Consolidated Traction Company, the New Jersey Traction Company and the Newark Plank Road Company met on March 25 in the joint office of the three companies in Jersey City, N. J., and elected officers. Edward F. C. Young was elected president of the three companies, and all of last year's officers were re-elected. President Young submitted a report showing that for the year 1896 the receipts of the consolidated lines increased nearly 10 per cent, while the percentage of operating expenses to receipts has been decreased nearly six per cent. There were 407 cars in operation during the year, and the number of miles run was 12,375,008. The increase in the number of passengers carried at the Pennsylvania ferry over 1892 was 17,466,455. Seven miles of track were added to the system, and the line connecting Newark with Jersey City, over the turnpike road, was completed.

A Seashore Electric Railway.

A press dispatch states that A. F. Gerald and I. C. Libby have purchased two valuable electric railroad charters, one for a road in Maine, the other for one in New Hampshire, both lines centering in Portsmouth, N. H. The two States are now connected by a dangerous, expensive toll bridge. The charter gives Messrs. Gerald and Libby the right to connect their two lines by a steam ferry across the Piscataqua River, thus bringing the towns of Eliot, Kittery and York in touch with Portsmouth, which is their natural market.

The ferry makes it possible to connect by an electric line two of the most famous beaches on the Atlantic coast—York Beach and Rye Beach. This 20-mile electric road was projected to do local business, but, it is said, a plan has been recently advanced by Boston and New York capitalists to make a grand boulevard of the whole 100 miles of seashore now dotted all along with noted watering places, and to fill in the missing links of electric railroad. There are already 50 miles in operation between Portland and Boston, and this, with the 20 miles to be operated under the Gerald and Libby charter, leaves but 30 miles to be built to complete the shore line electric road from Boston to Portland. This ride in the Summer would, it is thought, eclipse anything of the kind in the United States.

Street Railway Accountants Form an Association.

The meeting for the organization of the Street Railway Accountants' Association, of America, was held at the Hollenden Hotel, Cleveland, Ohio, March 23 and 24, 1897.

The meeting was called to order by Mr. H. H. Windsor, of Chicago. Mr. Morris W. Hall, of Camden, N. J., was elected temporary chairman, and Mr. W. B. Brockway, of Toledo, Ohio, temporary secretary. Committees on organization and nomination of officers were appointed.

The following gentlemen were present: Frank R. Greene, secretary Chicago City Railway Co.; Morris W. Hall, secretary Camden & Suburban Railway Co., Camden, N. J.; W. W. Herrick, adjuster Cleveland Electric Railway Co., Cleveland, Ohio; A. F. Walker, accountant Allentown & Lehigh Valley Traction Co., Allentown, Pa.; William F. Ham, secretary Nassau Electric Railroad Co., Brooklyn, N. Y.; D. A. Keister, auditor Marion City Railway Co., Marion, Ind.; W. B. Brockway, auditor Toledo, Bowling Green & Fremont Railway Co., Toledo, Ohio; F. S. Borton, secretary Cleveland, Painesville & Eastern Railroad Co., Cleveland; Charles L. Wight, auditor Toledo Traction Co., Toledo, Ohio; J. F. Calderwood, auditor Twin City Rapid Transit Co., Minneapolis and St. Paul, Minn.; F. T. Pomeroy, general manager and treasurer Cleveland, Berea & Elyria Railway Co., Cleveland; F. E. Smith, auditor Lynn & Boston Railroad Co., Lynn, Mass.; H. J. Davies, assistant secretary and treasurer Cleveland Electric Railway Co., Cleveland; E. S. Doud, secretary Lehigh Traction Co., Hazelton, Pa.; H. C. McJilton, secretary Baltimore Traction Co., Baltimore, Md.; H. L. Wilson, auditor West End Street Railway Co., Boston, Mass.; W. G. McDole, auditor Cleveland Electric Railway Co., Cleveland; William R. Avery, auditor Cincinnati Street Railway Co., Cincinnati, Ohio; W. S. Dimmock, general superintendent Omaha & Council Bluffs Railway Co., Council Bluffs, Iowa; P. V. Burlington, auditor Columbus Street Railway Co., Columbus, Ohio; John Erhardt, assistant secretary Cleveland City Railway Co., Cleveland; E. R. L. Tighe, accountant Brooklyn Rapid Transit Co., Brooklyn, N. Y.; W. G. Ross, comptroller Montreal Street Railway, Co., Montreal, Can.; A. L. Linn, Jr., bookkeeper Cleveland Electric Railway Co., Cleveland; J. M. Smith, comptroller Toronto Railway Co., Toronto, Ont.; Dana Stevens, accountant Eckington & Soldiers' Home Railway Co., Washington, D. C.; C. E. Reavis, secretary Augusta Railway and Electric Co., Augusta, Ga.; E. D. Hibbs, auditor Consolidated Traction Co., Jersey City, N. J.; Walter M. Barnaby, chief accountant Brooklyn Heights Railroad Co., Brooklyn, N. Y.; C. N. Duffy, secretary and treasurer Citizens' Railway Co., St. Louis, Mo.; Robert V. McCullough, cashier Southern Electric Railway Co., St. Louis, Mo.; Henry H. Windsor, *Street Railway Review*, Chicago; Edward E. Higgins, *Street Railway Journal*, New York; T. E. Crossman, stenographer, New York.

The following programme was carried out, the papers being carefully prepared and eliciting considerable discussion:

PROGRAMME.

TUESDAY, MARCH 23—10 A. M.

Call to order and election of temporary chairman and secretary.
"From Horse to Electric Accounts," H. L. Wilson, auditor West End Street Railroad, Boston.
"Suggestions for a Standard System of Accounts: Classification of Operating Expense Accounts, and Form of Report that Will Admit of Comparison and Diffuse Information between Companies," C. N. Duffy, secretary and treasurer Citizens' Railway, St. Louis.
Appointment of Committee on Organization.
Appointment of Nominating Committee.

TUESDAY—2 P. M.

"Monthly Closing of Accounts," Dana Stevens, accountant for receiver, Belt Railway, Washington, D. C.
"Transfer Tickets," Frank R. Greene, secretary Chicago City Railway.
"The Relation of Accountants to Managers and Employés," F. V. Burington, secretary and auditor Columbus Street Railway, Columbus, Ohio.

WEDNESDAY, MARCH 24—9.30 A. M.

Report of Committee on Organization.
Adoption of Constitution and By-Laws.
Report of Nominating Committee.
Election and Installation of Officers.
"A Simple System of Interurban Accounts," W. B. Brockway, auditor Toledo, Bowling Green & Fremont Railway, Toledo, Ohio.

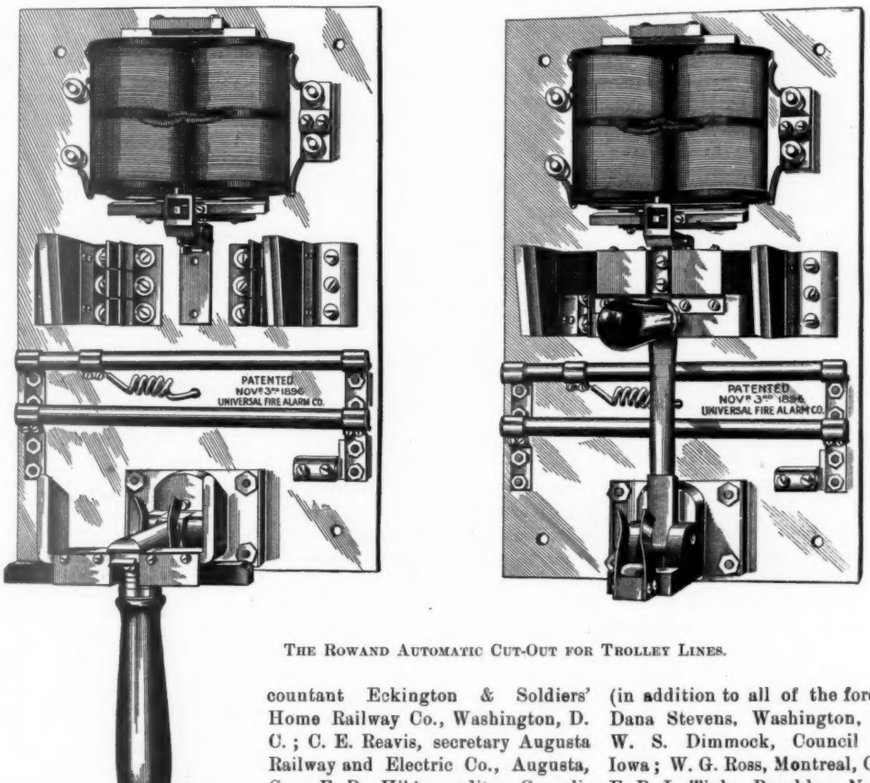
WEDNESDAY—4 P. M.

"Naming and Standardizing Apparatus," J. P. E. Clark, general manager Binghamton Railroad Company, Binghamton, N. Y.
"Depreciation," H. C. McJilton, auditor Baltimore Traction Company.
For General Discussion: "Statistical Reports in a Nutshell;" "Some Ways We Can Simplify Accounts;" "Standardizing Accounts."

The following officers were elected: President, Henry L. Wilson, Boston, Mass.; first vice-president, C. N. Duffy, St. Louis, Mo.; second vice-president, J. F. Calderwood, Minneapolis, Minn.; third vice-president, C. E. Reavis, Augusta, Ga.; secretary and treasurer, W. B. Brockway, Toledo, Ohio. Executive committee (in addition to all of the foregoing) Dana Stevens, Washington, D. C.; W. S. Dimmock, Council Bluffs, Iowa; W. G. Ross, Montreal, Canada; E. R. L. Tighe, Brooklyn, N. Y.

The afternoon of Wednesday was devoted to an extensive ride over the lines of the Cleveland railways, and an examination of several power houses. An interesting feature of the meeting was the large number of accounting blanks which were exhibited by the delegates.

The meeting adjourned to convene at the time of the meeting of the American Street Railway Association, October 19–22, 1897, at Niagara Falls, N. Y.



THE ROWAND AUTOMATIC CUT-OUT FOR TROLLEY LINES.

Westinghouse Motors Wanted.

A correspondent of the ELECTRICAL REVIEW desires to purchase a number of second-hand Westinghouse alternating-current motors. They are known as style No. 30, which is the old No. 3 Westinghouse motor with the addition of brushes. Any one having such motors for sale is requested to inform the ELECTRICAL REVIEW of the fact.

It is reported that the Portchester Railway, of Portchester, N. Y., has recently changed hands.

The Rowand Automatic Cutout for Trolley Lines.

At a recent meeting of the Franklin Institute, at Philadelphia, a working model was shown of a new device, designed as a preventative for electric circuits, to render harmless a section of broken or fallen trolley wire. The device is the regular switch used for high-tension currents and is caused to operate on the occasion of an interference, that is, by a parting or grounding of the wires, by means of an armature attracted by differentially wound magnets. This magnet has two windings which oppose each other, so that with the same amount of current running through each winding the magnet remains neutral. In case the trolley line, which is in series with one winding, should break, the other winding would energize the magnet and draw up the armature, which, acting as a circuit-breaker, would disconnect the trolley line from the cable or main supply wire. This section of trolley wire can also be made "dead" by opening a switch that will produce the same result as by a breaking of the wire, so that in case of a fire on the line of the road the trolley section adjoining the fire can at once be made harmless without delay and current can be restored to the cars. Another device connected with this sends the alarm to the power house, giving the number of the trolley section which is displayed. This device is one of a number of the inventions of Lewis G. Rowand, controlled by the Universal Fire Alarm Company, of Philadelphia, all of which have been in the line of life and property saving apparatus.

Inefficiency of Volunteer Fire Departments.

The Cicero, Ill., town board is trying to place the responsibility for an $18,000 fire, which two weeks ago destroyed Benard & Moreney's planing mill. It is alleged that the Cicero fire department was delinquent in responding to the alarm. In the north part of Cicero volunteer companies are stationed at Oak Park, Ridgeland and Austin.

The Ridgeland company answered a still alarm from the mill at 10.30 P. M. According to rules, the captain should have immediately notified the police, but the tape in the station shows no such notice until 11.04, Desk Sergeant Gaylord says. By the time the other companies responded to a delayed alarm the fire was beyond control. As no notice reached the waterworks either, extra fire pressure was delayed, and the only available streams would hardly reach across the street.

The Ridgeland firemen insist the alarm was promptly forwarded.

President Pierce, of the town board, says that if the charges prove true the fire department will receive a shaking up.

The *Telephone* is the name of a new monthly publication devoted to the field indicated by its title. The proprietors named are James E. Keelyn, William R. Mackrille, and Kempster B. Miller, all of Chicago. The paper is well printed, well made up, and has a spicy tone.

CHICAGO NEWS NOTES.

Roth Brothers & Company, manufacturers of high-grade small dynamos and motors, have in preparation a new edition of their catalogue which will contain several new specialties not heretofore advertised by this firm.

Munoz & Darley, general western agents for the "Cahall" water-tube boilers, are now nicely settled in their offices at the Rookery. Although having taken charge of this territory only about a month ago they have already booked several orders, and express themselves as very confident of a good, healthy increase in business this year.

W. H. Pearce & Company, Monadnock Block, are furnishing the mechanical stokers for the boilers in the new Lakeside Building, which is rapidly nearing completion. The stokers are of an entirely new design, recently patented, and are claimed to do away with the smoke nuisance in addition to having other excellent features.

Mr. W. T. McCaskey, of McCaskey & Holcomb Company, Springfield, Ill., spent a few days in Chicago last week. Among the contracts recently closed by this firm, Mr. McCaskey mentions the electric light and waterworks plant at Okolona, Miss., where his firm was the successful bidder. The electrical equipment will consist of a 1,200-light Fort Wayne alternator and an arc light equipment of the same make.

The Wallace Electric Company is just about nicely settled in its new quarters in the Marquette Block. The company, in addition to handling the well known apparatus of the Stanley Electric Manufacturing Company and the Eddy Electric Manufacturing Company, will hereafter carry a complete line of "Kerite" wires and cables, having made arrangements to that effect with the manufacturer.

The Central Electric Company is issuing a very attractively gotten up circular describing and illustrating a new linemen's reel and cart, which seems to meet all reasonable demands that can be made upon such a necessary adjunct to the line builders' tool equipment. It is light, yet strong and durable, being made entirely of malleable and wrought-iron, and is claimed to have all other valuable features that go to make up a desirable and serviceable piece of apparatus.

President W. H. McKinlock, of the Metropolitan Electric Company, is back from an extended trip throughout the western States, and speaks in enthusiastic terms of the unmistakable signs of returning prosperity, not only in the electrical and street railway field, but of the general business of the country, which, Mr. McKinlock rightly claims, must first be put on a sound basis before any permanent improvement in any particular trade can be looked for. The passage of the Dingley Bill, will, Mr. McKinlook thinks, be of decided advantage to the American manufacturer and dealer of electrical supplies, who, so far, has had to compete with the low-priced and often low-grade importations from across the sea.

The Electric Appliance Company, Chicago, advise their customers, and the electric railway trade generally, that they have made arrangements with the Ohio Brass Company to carry a complete line of their railway specialties in Chicago stock. The electric railway trade will undoubtedly appreciate the advantage of being able to send large or small orders for the Ohio Brass Company's specialties, and have the goods shipped from Chicago on the day the order is received. Both the Ohio Brass Company and the Electric Appliance Company hope this arrangement will be appreciated by the users of electric railway material.

A. Shillinglaw, of Chicago, representing The Bullock Electric Manufacturing Company, has already closed several important contracts for motors, etc., since the opening of the Chicago office. Among recent sales may be mentioned some large power motors to the Chicago City Railway. Mr. Shillinglaw also secured the contract for supplying transformers and all construction material to the West Baden, Ind., Springs Company, for illuminating the covered race-track at that place. The new Newaygo automatic circuit-breaker, handled by Mr. Shillinglaw, is, we are told, meeting with a ready sale. It is claimed to be far ahead of anything similar on the market, remarkably sensitive to changes in current, and made for any current, either direct or alternating. C. E. K.

Bullock Electric Company.

One of the prettiest bits of printing which has recently come to the ELECTRICAL REVIEW office is a little brochure, informing the electrical trade of the fact that Messrs. George Bullock and Robert T. Lozier have formed the Bullock Electric Company, with offices in the St. Paul Building, New York; Bourse Building, Philadelphia, and at 8 Oliver street, Boston, Mass. The object of the partnership is the selling and installing of electric light and power equipments, manufactured by The Bullock Electric Manufacturing Company, of Cincinnati, Ohio, formerly known as the Card Electric Motor and Dynamo Company. The change of name of this firm and the formation of its new connections have already been mentioned in the ELECTRICAL REVIEW.

The stockholders of the Fall River, Mass., Electric Light Company, at their annual meeting re-elected the following officers: President, Frank S. Stevens; clerk, Owen Durfee; treasurer, A. F. Dow; directors, F. S. Stevens, F. O. Dodge, J. D. Flint, Oliver S. Hawes, E. L. Anthony, J. E. Osborn, Rufus W. Bassett, Jerome C. Borden, James B. Harley. Last July the Fall River and the Edison companies were merged into one concern, and the capital put at $350,000. A dividend at the rate of six per cent per annum was declared.

THE INFLUENCE OF HEAT TREATMENT UPON THE MAGNETIC PROPERTIES OF HARDENED STEEL.

READ BEFORE THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, NEW YORK, MARCH 24, 1897, BY DR. K. E. GUTHE.

Steel and iron, when heated to high temperatures, show a decided change in their magnetic properties. The earlier investigations* have shown, that in general the temporary induction in iron and steel rods increases with increase of temperature. G. Wiedemann† found that very hard steel rods show at 100 degrees a larger temporary magnetic moment than at 0 degrees, soft rods a larger magnetic moment at 0 degrees than at 100 degrees for the same magnetizing force, after they had been repeatedly heated and cooled. Rowland‡ showed that a rise of temperature causes an increase of induction, if the magnetizing force is small, but a diminution of induction if the magnetizing force is large. The

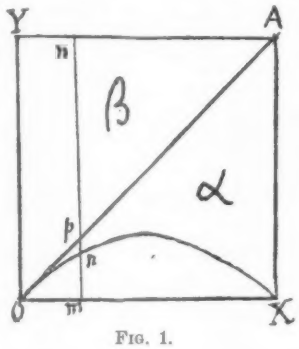


FIG. 1.

same was observed by J. Hopkinson,§ who undertook a great number of experiments in this line, especially in order to show the relation between the critical temperature, at which iron ceases to be magnetic, and the recalescence, first discovered by Barrett. According to the former recalescence occurs at the critical temperature. Osmond, who distinguishes three points of recalescence for soft steel, places the critical temperature at the second point of recalescence. Tomlinson's‖ and Kunz's* experiments show also the change in magnetic properties due to a rise of temperature.

After steel has been heated beyond recalescence and is suddenly quenched in cold water, the mechanical hardening is accompanied by a corresponding magnetic hardening, *i. e.*, the permeability decreases and the hysteresis loss increases greatly. This influence of hardening is well known, and was first thoroughly investigated by Ewing.† Very little is known about the influence of heat treatment on such hardened steel. Barus and Strouhal,‡ in an exhaustive paper, show the influence of tempering on the retentivity of steel magnets, and are the originators of the well known method of seasoning magnets by subjecting them for several hours to a temperature of 100 degrees, which method has recently been used very successfully by B. O. Pierce. Their results, as far as they have a bearing on the present research, are, (1) that the magnetic moment of a hardened steel magnet is smaller after reheating to about 100 degrees than it was before, and that on heating to still higher temperatures it increases again; (2) that the length of time during which the bars have been at the high temperature is of some influence, especially for the lower temperatures. The present work was undertaken with a view of following the annealing process step by step, and obtaining the relations between the magnetizing force, maximum induction, remanence and coercive force for each of these steps. The results are also interesting from a theoretical point of view, since they show a decided difference in the rate of change of the magnetic properties for the different temperatures.

*. Wiedemann's "Electricitæt", 2d ed., III., p 845-860.
†. G. Wiedemann. *Pogg. Ann.* 122, 346, 1864.
‡. Rowland. *Phil. Mag.* (4), 48, 321, 1874.
§. Hopkinson, *Phil. Trans.* 180 A, 442, 1889. *Proc. Roy. Soc.*, 48, 442, 1890.
‖. Tomlinson. *Phil. Mag.* (5), 25, 372, 1888.
*. Program Gymnasium zu Darmstadt, 1893.
†. Ewing. *Phil. Trans.*, 547, 1885, or Ewing, "Magnetic Induction," etc., p. 82.
‡. "U. S. Geological Survey" No. 14, 1885.

DESCRIPTION OF THE METHOD.

The rings were all of the same form, *i. e.*, hoops with an average diameter of 12.6 centimetres and a thickness of only eight millimetres. The diameters were measured by vernier calipers and the cross-section was found by dividing the volume, which was determined by the loss of weight in water, by the average circumference. New measurements were taken every time after the rings had been subjected to a temperature higher than 600 degrees. They were wound with bicycle tape, and on this the primary coil. Before each experiment the insulation was carefully tested. Rowland's ballistic method was employed. Instead of the usual way of finding the constant of the galvanometer by means of an earth coil, I charged and discharged a standard condenser through the galvanometer (see Carhart & Patterson's "Electrical Measurements"). The equations used will then be

$$B = \frac{d_2 C E r}{c n_2} \frac{100}{A}$$

where

B = the increase in induction,
d^2 = the deflection due to the change of the magnetic flux through one square centimetre of the ring,
C = the capacity of the standard condenser expressed in microfarads (= .2 microf.),
E = the electro-motive force of the Carhart–Clark cell in volts,
r = the total resistance of the secondary circuit,
c = the deflection obtained by the discharge of the condenser,
n_2 = the number of secondary turns around the ring, which was equal to 30 in every case,

and

A = the cross-section of the ring.

$$H = \frac{4 \pi n_1}{10 L} I$$

where

H = the magnetizing force.
n_1 = the number of primary turns on the ring,
I = the magnetizing current expressed in amperes,
L = the average circumference.

The deflection due to the discharge of the condenser was taken on open circuit. This produces an error in the constant. An independent experiment showed that the value obtained is 1.50 per cent too large. In order to obtain the absolute values for B in the following tables, the data should be multiplied by .985. In order to eliminate the error due to the creeping up of the induction, the steps taken were as nearly as possible the same for the same ring at different stages of the treatment. I believe the total errors of observation to lie within .5 per cent. The

experiments at each step for each ring consisted in the determination of the hysteresis curves for a number (8-10) of different magnetizing forces, the largest in every case being between 60 and 65. In the final results I give the hysteresis curves for the largest values of H only. The magnetizing curves were taken, but they are not given under the following results, since, as Hopkinson has shown, this curve for virgin steel differs appreciably from one taken with a ring previously magnetized. It was thought to be of more importance to represent the curves for B_m and B_r as functions of the maximum magnetizing force. (See plate 4.) Moreover, it was possible to show the influence of the reheating upon Houston and Kennelly's law, *i. e.*, that for small magnetizing forces the remanence (B_r) is a linear function of the maximum induction (B_m). These two values, B_m and B_r, are plotted on Plate 5, and these curves are of great interest, showing the range through which this law holds good in the different stages of the heating process, and what variations in the constants are produced by the tempering.

CHEMICAL ANALYSIS.

The chemical analysis of the rings gave the following results:

	Ring I. Crescent Steel.	Ring II. Basic Steel.	Ring III. Very Soft Steel.	Ring IV. Swedish Iron.
Carbon.....	.868%	.309%	.0755%	.144%
Silicon.....	.234	.025	.0155	.0634
Sulphur.....	trace	.059	.0045	.015
Phosphorus..	.0173	.146	.124	.018
Manganese...	.27	.78	.36	trace

For the chemical analysis and the heat treatment of the rings, I am greatly indebted to Prof. E. D. Campbell, director of the metallurgical laboratory, and his assistant, Mr. A. R. Miller. I gladly express my deep obligations to them, especially to Professor Campbell, who devised and superintended every particular of the complete heat treatment.

The rings were first heated in the original state and then subjected to the heat treatment. The different steps taken are the following:

A. Rings in the original state.

B. Heated to about 670 degrees and quenched.

C. Heated to a little over 900 degrees and quenched.

The hardened rings were then tempered by reheating to the temperatures indicated below, and then allowed to cool slowly. D, 100 degrees for one hour; E and F, 100 degrees for 24 hours; G, 200 degrees; H, 300 degrees; I, 450 degrees; K, 800 degrees; L (only for rings II and III), about 950 degrees.

RESULTS.

A. Rings in the original state.

The measurements of rings gave the following data:

	Ring I.	Ring II.
Mean diameter.....	12.607 cm.	12.699 cm.
Volume.....	95.099 cm³	90.637 cm³
Cross-section	2.401 cm²	2.021 cm²
	Ring III.	Ring IV.
Mean diameter.....	12.68 cm.	12.607 cm.
Volume.....	109.29 cm³	107.99 cm³
Cross-section.....	2.754 cm²	2.727 cm²

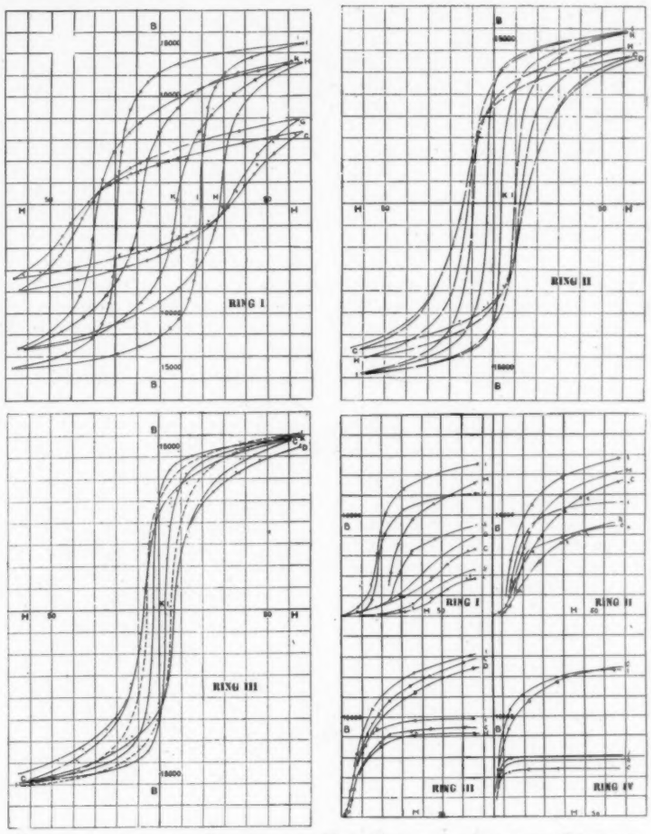
As I stated before, these measurements were repeated every time after the rings had been subjected to a high temperature, so after the following steps: B, C, K and L. Each time a small decrease of the cross-section was observed.

In the original state, the hysteresis curves for only one maximum magnetizing field (H) of about 60 were determined, except for ring I, for which the value of H was varied. In the following tables, n_1 designates the number of primary turns, c the deflection of the galvanometer, obtained by the discharge of a capacity equal to .2 microfarad charged by a Carhart-Clark standard cell, d the deflection of the galvanometer due to the change of the lines of magnetic force in the ring, B the calculated value of the induction, I the current in the primary measured in amperes, H the value of the magnetizing force.

It will be noticed that I give only the values of B and H for one side of the hysteresis curves. Since the same steps were taken on the ascending and descending branch of the loop, the values were generally identical, and are, therefore, not recorded in the following tables, though the whole cycle was taken in the actual experiments.

[The tables referred to will be printed later.—Ed.]

The hysteresis curves show strongly the influence of carbon, the area of the loops diminishing with the decreasing percentage of carbon. The mild steel shows, indeed, a curve very similar to that of wrought iron. The maximum induction, taking the rings in the order I, II, III, has the values, 13,840, 15,070, 15,290 lines of magnetic force, while the magnetizing force was very nearly the same in all cases. The corresponding coercive forces are 8.6, 2.7 and 3.6.



PLATES I TO IV.—THE INFLUENCE OF HEAT TREATMENT UPON THE MAGNETIC PROPERTIES OF HARDENED STEEL.

B. Rings heated to 675 degrees and quenched—The rings were then introduced into furnaces, which were well heated beforehand. On the bottom of the muffles was put a sheet of asbestos, and over this two strips of the same material, on which the ring was placed. In order to prevent oxidation as much as possible, charcoal was put in the opening of the muffle. The heating to a dull cherry red took about eight minutes. Then the ring was withdrawn quickly and quenched in water at five degrees centigrade.

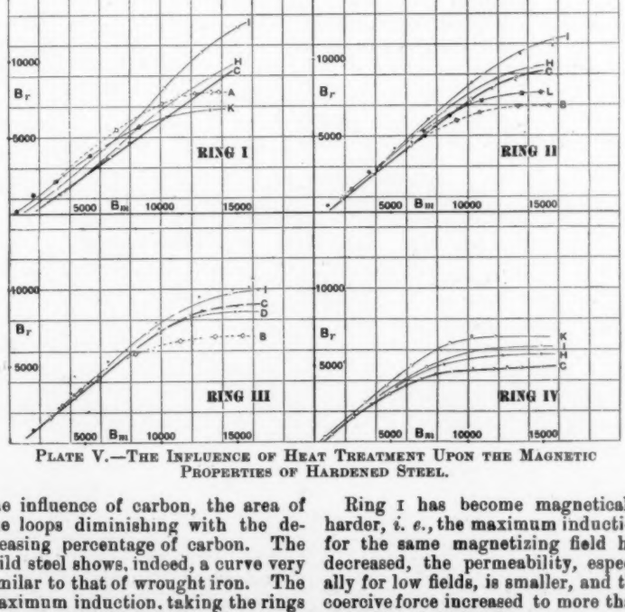


PLATE V.—THE INFLUENCE OF HEAT TREATMENT UPON THE MAGNETIC PROPERTIES OF HARDENED STEEL.

Ring I has become magnetically harder, *i. e.*, the maximum induction for the same magnetizing field has decreased, the permeability, especially for low fields, is smaller, and the coercive force increased to more than twice its original value.

The iron ring shows an increase in permeability, which may be explained by a previous mechanical hardening, when it was turned to its proper shape.

In rings II and III there is no sign of magnetic hardening, the principal influence of this treatment being the remarkable drop of the remanence, while the maximum induction remained almost unchanged. The permeability, on the other hand, decreased a little. This sudden and unexpected drop in retentivity will again be met later on and discussed there more fully.

It is apparent that we have not passed the temperature at which low carbon steel is hardened. It is well known that the second and third point of recalescence for low carbon steel lies at a higher temperature than the corresponding point in the high carbon steel, which, apparently, had already been passed in the case of the high carbon steel. It is, therefore, probable, though I do not consider this experiment as an absolute proof, that the magnetic hardening takes place when steel is quenched after it has been heated to the same temperature at which recalescence occurs, *i. e.*, the critical temperature at which, according to Hopkinson and others, iron loses its magnetic properties.

C. Rings heated to a little above 900 degrees and quenched in ice water of five degrees—The heat treatment was the same as in B, but the temperature was raised beyond the third point of recalescence of the low carbon rings.

All the steel rings show the hardening effect, the same being the smaller the less carbon the steel contained.

The high carbon ring (I) shows a decided increase in the hysteresis loss, which is much greater than the increase due to the first heating. While the first time the temperature was raised only a little beyond the point of recalescence, it was this time at least 250 degrees higher. We draw therefrom the important conclusion that steel becomes magnetically the harder, the more the temperature is raised beyond the recalescent point. The passing of this point by only a few degrees is not sufficient for the maximum effect.

The hysteresis curves for the steel rings are given on Plates 1–3, the maximum induction (B_m) and remanence (B_r) as a function of the magnetizing force on Plate 4, and B_r as a function of B_m on Plate 5.

D. Rings reheated to 100 degrees for one hour—The corresponding curves are marked by crosses on the plates, and are drawn only for the low carbon rings, the change being very small for the high carbon steel. The influence of this step becomes more apparent the less carbon the steel contains, and it consists in a lowering of B_m as well as B_r in rings II and III, and in a slight raising of the same quantities in ring I. The coercive force in III has become slightly larger. The low carbon steel becomes, therefore, magnetically harder when it is reheated to 100 degrees. This result is consistent with the observations of Barus and others, mentioned above.

E and F. Rings were heated to 100 degrees for 24 hours.—The heat treatment was the same as in the preceding case, except that the time of the heating was increased. I do not give the results, since no decided change takes place. The curves almost coincide with the preceding ones, though there is an unmistakable increase of permeability, especially for small magnetizing fields, this change being largest for the high carbon steel. We have, therefore, a more or less pronounced influence of the time during which the rings were subjected to this temperature, consisting in a slight increase of permeability.

[To be concluded.]

ADVANCE INFORMATION

Electric Light and Power.

NEW HAVEN, MICH. — Electric lights are to be established here.

BORDENTOWN, N. J.—The contract for lighting the city for the ensuing year has been let to the Bordentown Electric Light and Motor Company for the sum of $3,600.

STROUDSBURGH, PA. — Electric lights are to be established here.

SKOWHEGAN, ME.—Weston & Company have sold their extensive lumber mills and water power here to the Skowhegan Electric Light Company for $40,000. The purchasers will use the power for electric lighting and other purposes, but Weston retains the use of the lumber mill for three years.

FALL RIVER, COLO.—W. B. Rundle, N. A. Chamberlain and B. F. James have incorporated the Fall River Electric Power Company, of Clear Creek County. Its capital stock is $250,000. Directors, B. F. James, N. A. Chamberlain, W. R. Chamberlain and S. W. Jacobs, and its offices will be in Denver. A water-power plant in Clear Creek County is projected by the company.

MARTIN, MICH.—Residents of this place are negotiating for the establishment of an electric lighting plant.

LACONIA, N. H.—The Winipisiogee Gas and Electric Company has been incorporated, with a capital of $25,000.

TIFFIN, OHIO—The citizens of Bloomville, a small town near this city, are organizing a company for the erection of an electric light plant for their own town. The leading business men of the town are in the enterprise.

GREENUP, KY.—John L. Sowards has let the contract for his electric light plant to the Commercial Electric Company, of Indianapolis, Ind., and it is expected to have it in full operation in 30 days.

SALISBURY, N. C.—City Commissioners may be addressed concerning establishment of electric light plant.

AUGUSTA, GA.—An electric light and power plant will be established.

LANGDON, N. D. — An electric light plant will be established.

SHELBY, IOWA—City Clerk may be addressed concerning establishment of electric light plant.

CREIGHTON, NEB. — An electric light plant has been established, and is in operation.

WINTHROP, MINN. — City Clerk may give information concerning establishment of an electric light plant.

APPLETON, MINN.—The Appleton Electric Light and Power Company has been organized, with A. S. Williams, manager, and E. Pickthorn, secretary and treasurer.

MINOT, N. D.—City Clerk may give information concerning establishment of electric light plant.

CROWLEY, LA.—A. L. Chappuis, Mayor, may be addressed concerning erection of an electric light plant.

KANSAS CITY, MO.—J. D. Stark, Warden, may be addressed concerning establishment of $5,000 electric light plant.

ITASCA, TEX.—C. C. Weaver, Mayor, may give information concerning construction of an electric light plant.

VENUS, TEX.—A. P. Thomas desires estimates on cost of electric light plant of 200 to 300 lights.

New Electric Railways.

NYACK, N. Y.—It is reported that a trolley line is to be built between this place and West Nyack.

NEW BRIGHTON, PA.—The Beaver Valley Traction Company has secured the right of way to extend its lines a mile and a half down the Ohio, from Beaver to Vanport. The work will be rapidly pushed to completion.

WATERVILLE, ME. — A. F. Gerald and I. C. Libby, electric railroad promoters and constructors, have purchased the franchises of two roads, one in Maine and the other in New Hampshire. The two roads just purchased will be put under one line, which will be extended from York Beach, through Kittery, across Piscataquis River by Stearns's ferry, through Portsmouth to Rye Beach.

BENTON HARBOR, MICH. — Five new railways will be built here this Summer. The latest is an electric road to be built by S. McCord and other capitalists to Eastman Springs, a distance of four miles.

READING, PA.—A public meeting will shortly be held in Bernville, this county, for the purpose of raising money to construct an electric railway between that place and this city. The estimated cost is $100,000, of which $50,000 is to be raised by subscription and the balance by issuing bonds.

GARDNER, MASS. — The Electric Street Railway Company are reported to have purchased ground, etc., of Westminster National Bank, and will erect a power station for running the electric railway.

MANSFIELD, MASS.—The Mansfield & Easton Electric Road will be built immediately, to connect with the Brockton system.

ALTOONA, PA.—Local capitalists will build a new electric road to Elmwood at a cost of about $75,000.

LANSING, MICH.—An electric railway will probably be constructed from Standish to Au Gres.

CATSKILL LANDING, N. Y.—The Catskill Electric Railway Company has been granted permission to construct its road from this place to Jefferson Heights.

PAINESVILLE, OHIO—Eastern capitalists have asked the County Commissioners for a franchise for an electric street railroad from this place to Fairport.

JALAPA, MEX.—C. E. Loss & Company, of this city, will build an electric railway in Mexico, the first road of the kind in that country. The line will be built at this place, and its first cost will be $400,000. All the material for construction has been contracted for in the United States. Water will furnish the power.

ST. LOUIS, MO.—City Clerk may give information concerning construction of an electric line from this city to St. Charles.

WILMINGTON, DEL.—The Westchester Electric Railway Company will make application for charter.

NORWAY, ME.—An electric road will probably be built to Waterford and Stoneham.

New Telephone Companies.

MT. CLEMENS, MICH.—A franchise has been granted to the new State Telephone Company to establish and operate a telephone plant in this city. The rates call for $24 for business places and $18 for residences. Work will commence immediately, and a line between Mt. Clemens and Detroit will be in operation by May 1.

MARSHFIELD, WIS.—A telephone line will be built from this city to Medford as soon as Spring opens. The poles are already in place. Among the lines contemplated are two from this city, one running to Wausau and the other to Grand Rapids and Centralia.

ARCOLA, ILL.—A telephone system is to be established here. The council has granted a local company a franchise to put in a system, and work will be begun on it at once.

ELWOOD, IND.—It is reported tonight that the Bell Telephone Company, of Chicago, will buy the Elwood exchange.

BLACK CREEK, N. Y.—A telephone line is soon to be put up between this place and Rushford, taking in the Simpson stables at McGrawville.

COLUMBIA, TEX.—Columbia Telephone Company has been incorporated; capital stock, $2,000. Purpose, to build and operate a telephone line from this place to Arlington and Alvin. Incorporators, John A. Cartlett, J. C. Fiekney and J. N. Shapard.

CUMBERLAND, MD.—The Chesapeake & Potomac Telephone Company is arranging to build a line from this place to connect with the system between here and Hagerstown. The line will follow the National pike and have long-distance advantages with the neighboring counties in Pennsylvania and West Virginia.

MT. CLEMENS, MICH.—The Common Council recently granted to the new State Telephone Company a franchise to establish and operate a telephone plant in this city.

GOTHENBERG, MO.—A telephone exchange is to be established here.

PAULDING, OHIO—The board of directors of the Paulding Home Telephone Company have organized and elected officers. The contract was let to construct a line from Wortsville to Tipton, also to view the route from Antwerp to Hicksville.

New Manufacturing Companies.

PORTLAND, ME. — The United States Signal Company has been organized for the purpose of manufacturing and dealing in electrical and mechanical apparatus; capital stock, $200,000. President, Orland W. Hart, of Fall River, Mass.; treasurer, George M. Power, of Medford, Mass.

NEW YORK, N. Y.—Payne Engineering Company has been incorporated to manufacture gas and steam engines and electrical apparatus; capital, $10,000. Directors, Stephen H. Payne and Nathan B. Payne, of New Brighton, S. I., and Albert G. Duncan, of New York.

NEW YORK, N. Y.—The Manhattan Construction and Equipment Company has been incorporated for the construction and equipment of railroads; capital, $500. Directors, Edward P. Steers, John A. Megargee and Davenant Rodger, of New York city.

Increase of Capital.

FREELAND, PA.—The stockholders of the Electric Company will, on May 10, vote upon a proposition to increase the capital stock to $30,000.

PITTSBURGH, PA.—A special meeting of the stockholders of the Central District and Printing Telegraph (Telephone) Company will be held, to vote upon a proposition to increase the capital from $2,500,000 to $4,000,000.

GENERAL NOTES.

The Standard Air-Brake Company, New York city, reports good business for March, and in addition to deliveries at home, secured several good orders from abroad, including one by cable for air-brakes for the Colonies.

The Downington, Pa., Electric Light Company has notified its patrons that business would be suspended on April 1. The company is composed of Philadelphians, and was organized eight years ago. The plant has not been a paying investment, and no dividends were paid. A movement is on foot to organize a home company and purchase and keep the plant in operation.

The Consolidated Traction Company, of Pittsburgh, Pa., intends to begin the erection of an immense power plant, the building and machinery to cost about $400,000. The plant is to be located at Twenty-sixth street near the Alleghany River. The machinery will cost from $250,000 to $300,000, and will consist of engines, boilers, dynamos, etc. The building will cost about $125,000. The work on the building will be commenced in the Summer.

A franchise has been granted to the St. Louis, Mo., Fenton & Southwestern Railway Company by the St. Louis County Court to build and operate an electric railroad from the southwestern limits of St. Louis, at Loughborough avenue, Carondelet, to the western limits of St. Louis County, at Fenton, and thence into Jefferson County to Morse's mill. The fare for passengers is not to exceed five cents from the city limits to Sappington, and five cents additional from Sappington to Fenton. The company must file its acceptance within 90 days, together with a bond of $10,000.

Kindred.... ...Interests

R. S. Hale has opened an office at 31 Milk street, Boston, for the practice of steam, mechanical and other branches of engineering.

Removal.—"The Official Railway Equipment Register" and "The Pocket List of Railroad Officials" have been removed to Room 17, at 24 Park place, New York city, owing to the need for increased facilities.

The Armorite Interior Conduit Company, 478 Fort street, West, Detroit, Mich., has issued a new circular and price-list of the company's steel Armorite conduit, manufactured under the Cummings patents. In this circular notice is also given that the Armorite conduit is approved by the National Board of Fire Underwriters.

Thomas Hill, Jr., electrical manufacturer and contractor, 128 Water street, New York city, has just completed arrangements by which he will represent, in the New England States and in the territory as far west as Syracuse, N. Y., the Ahlm-Edwards Electric Company, of Medina, Ohio. This company manufactures multipolar dynamos and motors.

The Metropolitan Electric Company, of Chicago, has been given the agency for the Thompson-Brown arc light hanger-board. This is claimed to be one of the best hanger-boards on the market, is neat, well built, of good mechanical construction, and a good seller, filling all the requirements of the underwriters, and one that it is expected will meet the approval of the best electricians.

The Forest City Electric Company, Cleveland, Ohio, have recently issued a very handsome catalogue describing their well known "roll-drop" and drop-forged commutator bars. The catalogue is printed in three colors and is a splendid example of the printers' art. The testimonials included in the catalogue are of the highest character and should be of great service to the Forest City Electric Company.

Elmer P. Morris, manufacturers' agent, has removed his offices from 36 Dey street, New York city, to Rooms 40, 41 and 42 Smith Building, 15 Cortlandt street, where he has secured the increased facilities which his rapidly growing business has recently made necessary. Mr. Morris represents a popular line of specialties, and his many friends will be glad to hear of his increasing success.

The Conover-Coe Company, Chicago, reports that its introductory sales of the Hartford switch are very gratifying. They are now showing an indicating switch that will, no doubt, find favor with consumers, on account of its simplicity and small additional cost over the price of an ordinary switch. This company is also the sales agent for the Dicke Tool Company, and is filling many orders for construction and linemen's tools.

The American Electric Telephone Company is getting its new and commodious suite of offices and showrooms gradually into presentable shape at 171–173 South Canal street, Chicago, it proving quite a task to attend to the many details incidental to moving a concern of this kind without neglecting any of the numerous demands for apparatus that are constantly coming in. Mr. H. C. Dodge, who, as manager of the Standard Telephone and Electric Company, became well and favorably known to the telephone world, has become associated with the American Electric Telephone Company, Chicago, as general manager. The company is to be congratulated on securing the services of Mr. Dodge, who will doubtless find many opportunities for exercising his executive ability in his new field of work.

"Cahall" Water Tube Boiler.—The fourth edition of the Cahall sales department's catalogue has just been issued and is now being distributed from the company's Pittsburgh office. It is a splendidly gotten up book of 98 pages, and should really be called a treatise on water-tube boilers instead of a catalogue. While the work treats of only one subject, "Cahall" boilers, this is handled in such an interesting, almost fascinating manner as to hold the attention of the most unwilling reader. To a certain extent this is perhaps due to the excellent typographical get up of the work. In addition to a complete description of the several types of boilers and accessories manufactured by the company, the book contains valuable data and results of tests, which will prove useful and interesting to any steam user.

After a year's study and experiment on fluorescent crystals by numerous investigators, it is thought by a great many scientists that the most important advance along this line is the fluorescent crystal discovered by Mr. T. B. Kinraide, at the Spring Park Laboratory, Jamaica Plain, Mass. These fluoroscopes and fluorescent screens are replacing in a great many hospitals and laboratories those made of tungstate of calcium, and wherever the value of this fluorescent salt is known they are being adopted. For X-ray photographic work it accomplishes the result of showing each image undimmed by the phosphorescence or previous exposure, having a peculiar volume and intensity of light with the perfectness of definition. This same result is obtained to a degree by the use of platinocyanide of barium, but this crystal, owing probably to molecular decomposition caused by the X rays, changes and loses its power after a little use.

Prizes for Two Inventors—A highly interesting competition between a large number of new inventions has just been decided by a very distinguished board of awards, and a handsome cash prize and solid gold medal awarded as the result of the decision. For some time the patent firm of John Wedderburn & Company, of Washington, D. C., have given a monthly reward of $150 to the inventor who should submit the best invention from the standpoint of simplicity, novelty and utility. The Board of Awards, composed of Senator William Stewart, of Nevada, chairman; Representative Claude A. Swanson, of Virginia; Mr. John C. Eckloff, cashier of the Second National Bank of Washington, and Messrs. A. C. Moses, of W. B. Moses's Sons and Frederick E. Woodward, of Woodward & Lothrop, two of the leading merchants of the capital city. This board has just selected the prize winners in the contest participated in by inventors who submitted their devices during the month of January. The prize of $150 goes to William Taylor, of Kearney, N. J., the inventor of a bicycle brake of simple construction, and the gold medal to Theodore G. Thomas, of Lamarque, Tex., for a monkey wrench of novel design.

STEAM ENGINEERING
(Stationary, Locomotive or Marine); Mechanics; Mechanical Drawing; Electricity; Architecture; Architectural Drawing and Designing; Civil, Railroad, Bridge, Municipal and Hydraulic Engineering; Plumbing; Mining; Prospecting; English Branches.
The Steam Engineering course is intended to qualify engineers to secure Licenses.
Send for Free circular and Book of Testimonials, stating the subject you wish to study, to
The International Correspondence Schools, B 1008, Scranton, Pa.
TAUGHT BY MAIL
THOROUGH

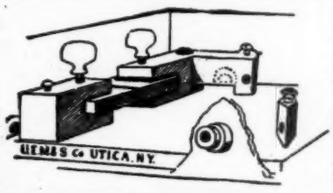
ELECTRIC CONDENSERS.
WM. MARSHALL,
Manufacturer.
STANDARDS A SPECIALTY.
709 LEXINGTON AVENUE. NEW YORK.

WHITNEY ELECTRICAL INSTRUMENT CO., MANUFACTURERS OF
High-Grade Electrical Instruments of Every Description.
PENACOOK, N. H., U. S. A.

STYLE "H" BELL.
PIVOTED ARMATURE.
DOUBLE ADJUSTMENT.
RELIABLE RINGER
Send for New Catalogue.
HUEBEL & MANGER, MANUFACTURERS,
226-30 Graham St BROOKLYN, N. Y.

McCASKEY & HOLCOMB
COMPANY,
CONTRACTING ENGINEERS,
SPRINGFIELD, ILL.
We make a specialty of constructing Municipal Electric Lighting Plants.
Send for Estimates and Valuable Information.

ROYCE & MAREAN,
DEALERS IN
Electrical Supplies,
WASHINGTON, D. C.



LIGHTNING ARRESTER.
ARC-KNIFE SWITCH.
MAST-ARMS.
Write Us. Get Our Discounts.
Utica Electrical Manufacturing and Supply Co., UTICA, N. Y.

THE ELECTRICAL MERCANTILE AGENCY.
318 BROADWAY.

Publishers of
The Electrical Trades Credit Reference Book.
Containing the names, with capital and credit ratings, of all business houses in the electrical trade in the United States and Canada.
Over 10,000 Correspondents.
Special facilities for prompt collections.
P. M. MOWREY, General Manager.

ELECTRIC PASSENGER BOATS
A PAYING INVESTMENT AT
STREET RAILWAY PARKS and PLEASURE RESORTS.

TRAFFIC PROMOTERS.
Stimulating Pleasure Riding.
Various Designs and Sizes.
Send for Special Catalogue.
THE ELECTRIC LAUNCH CO.,
MORRIS HEIGHTS, NEW YORK CITY.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED MARCH 23, 1897.

579,161 Electric arc lamp; J. A. Mosher, Chicago, Ill.

579,169 Telegraph call bell; J. A. Newsom, St. Louis, Mo.

579,170 Electrically operated signal or semaphore; J. N. Newsom, St. Louis, Mo.—A shaft rotatably mounted, a collar loosely mounted upon one end of said shaft, a lever fixed to said collar, a lever fixed to said shaft, signals upon corresponding ends of said levers, connections between said levers, and electrically controlled mechanism whereby said levers are operated in opposite directions.

579,190 Vehicle light and governor for same; D. W. Stinson, St. Louis, Mo.—A revolubly mounted shaft having a longitudinal groove, a collar fixed to the shaft, a second collar slidable on the shaft, a rod slidable in the groove of the shaft and connected to the slidable collar, a wheel slidable on the shaft and connected to the rod, and means for connecting the fixed and sliding collar, such means being capable of moving the sliding collar under the influence of centrifugal force.

579,211 Electrical amalgamator; William Wright, New York, N. Y.

579,213 Device for house wiring; H. R. Young, Lakeport, N. H.—A magnetized body having provision for attachment to a fishing-wire, and magnetized and provided at one end with a plurality of hooks.

579,227 Electric incandescent lamp; F. L. Fowler, Philadelphia, Pa.—A lamp consisting of a globe having an enlargement or beaded portion in its upper extremity, the neck, a middle piece, a filament attached to the latter, a collar having inwardly turned extremity adapted to engage said portion B, a filling or packing of suitable material between said collar and neck, and a threaded base attached to said collar.

579,239 Telephone spring-jack; W. O. Meissner, Chicago, Ill.—A circuit changing device, comprising a spring contact, interposed between two stationary contacts, and insulating pin provided at one end with a device adapted to limit its inward movement, and at the other end with a conductor adapted to engage said spring contact when the pin is in a predetermined position, said insulating pin provided with an inclined surface, opposed to a V-shaped projection on the spring contact, so as to engage the same when said pin is moved to the limit of its inward movement.

579,249 Electrical gas cock; F. W. Ackerman, Corning, N. Y.—A separable casing, an oscillating valve mounted therein, and having a pendent cylindrical portion with a flattened side adapted to bring the valve-openings into communication with each other, and electro-magnets for oscillating or partially rotating said valve, either in one direction or the other.

579,267 Carbon holder; C. E. Harthan, Lynn, Mass.

579,268 Arc light cut-out; C. E. Harthan, Lynn, Mass.—A quick-acting switch, comprising a pair of levers on either side of their pivotal points, and movable riders mounted at said pivotal points and having roller bearing edges, not conforming to the edges of the levers, with an actuating part comprising rollers, yieldingly bearing against and movable along said levers and said riders, and a swinging lever for operating the rollers and connected therewith, so as to afford lost motion during the throw of the lever.

579,273 Zinc for electric batteries; F. A. Lane, Torrington, Ct.—Is provided with a protecting coating encircling the major portion of its periphery, and a limited exposed portion extending along its length in the longitudinal space left in said encircling coating.

579,283 Alternating current dynamo-electric machine; C. P. Steinmetz, Schenectady, N. Y.—A source of alternating current, lines leading therefrom, and a transformer connected to the lines comprising primary and secondary coils, a magnetic shunt, a series coil upon the shunt, opposing the passage of magnetic lines through the shunt, and a commutator in circuit with the secondary coil of the transformer.

579,299 Telephone exchange system; J. E. Keelyn, Chicago, Ill.—Divided boards, an answering and a calling plug connected by a cord circuit at one of said boards, a trunk line for inter-connecting said boards and transfer plugs at one or more other boards, said cord circuit and transfer plugs being connected in multiple with said trunk line.

579,300 Electric railway; E. Lachmann, Hamburg, Germany.

579,324 Electric furnace; W. S. Hadaway, Jr., New York, N. Y.—The method of generating and uniformly distributing heat over a given surface, which consists in passing a current of electricity through a mass of conducting fragments placed in close contact, subjecting the glowing mass to the action of a hydrocarbon gas and coincidently combining the carbon element of said gas, with the glowing mass and the hydrogen element thereof, with a free gas containing oxygen.

579,344 Electrical measuring instrument; E. J. Houston and A. E. Kennelly, Philadelphia, Pa.

579,366 Circuit breaker; F. C. Robertson, Toronto, Canada.

579,380 Trolley support for electric railway cars; J. F. S. Branth, New York.

579,393 Electric sunshine annunciator; L. Hunt, St. Louis, Mo.

579,395 Electrical transformer; F. H. Jeannin, Arcadia, Fla.

579,431 Automatic electro-magnetic circuit breaker; W. E. Harrington, Philadelphia, Pa.—Consists of the switch of two cores, a solenoid coil and a ratchet device, the cores movable in the magnetic field of the coil and adapted to be actuated by the current passing through the coil to actuate the switch, with movable weights and set screw as means of adjustment with respect to amount of excessive current or voltage necessary to actuate it.

579,459 Electric heater; G. H. Whittingham, Baltimore, Md.

WRITE FOR PRICES.
THE ORIENT ELECTRICAL CO.
YOUNGSTOWN, OHIO
MAKERS INCANDESCENT LAMPS.

$25.00, $15.00, $10.00,
In Gold, will be paid to the three purchasers sending in the most solutions of this novel Egg Puzzle. Interests and amuses young and old. Requires patience & steady nerves. Send 15 cts. for Puzzle, (2 for 25 cts.) and learn how to secure a PRIZE.
PUZZLE
Walter S. Coles, Neave Building, Cincinnati, Ohio.

THOMAS HILL, Jr.,
Experimental Electrical Work
AND
Electrical Advertising Novelties.
REPAIRING IN ALL ITS BRANCHES.
Special Apparatus Designed and Built.
198 Water Street, New York City.

FOR LIFE, LIGHT AND ECONOMY,
BEACON LAMPS
HAVE NO SUPERIORS!
We make lamps of every description, from 1-2 to 300 c.-p., and guarantee them to give our customers entire satisfaction.
BEACON LAMP CO.
NEW BRUNSWICK, N. J.
Royal Electric Co., Montreal, AGENTS FOR CANADA.

"Dixie." The Southern Industrial Journal, tells the truth about Southern conditions and possibilities. If you are interested, send 25 cents for 3 months or $1 per year. THE "DIXIE" CO., Atlanta, Ga.

WANTED—A YOUNG MAN who has had success in selling steam engines. Must have had fair technical education (immaterial whether college or night school), with practice. Salesman art essential. Obedience also essential. State present salary, or salary and commission, amount of sales and district.
Communications absolutely confidential.
W. H.
450 Fifth Ave., New York City.

WATER-POWER FOR SALE.
120 horse-power. Turbine Water-wheel. Wheel-house, Two-story brick building, 36x171 feet; also main line of shafting. Power reliable. On two railroads. About four hours from New York and Boston.
Apply to
"R. E. H," Lock Box D,
WEST WINSTED, CONN.

W. R. OSTRANDER & CO.,
22 DEY STREET,
Manufacturers of
SPEAKING TUBES, WHISTLES, ANNUNCIATORS.
Electric and Mechanical Bells.
FACTORY,
De Kalb Ave.,
BROOKLYN.
Send for Illustrated Catalogue.

DYER & DRISCOLL,
PATENT SOLICITORS,
36 WALL STREET, N. Y.,
Have done all my patent soliciting work, both for this and foreign countries, continuously for the past fourteen years.
Thomas A. Edison

PATENTS.
TRADE MARKS.—DESIGNS.—COPYRIGHTS.
CAN YOU OBTAIN A PATENT?
Send me a model or drawing of your invention, and a description, and I will examine same and advise you promptly. My fees are moderate in all Patent matters, and I can obtain a Patent in the shortest possible time.
All Patents taken out through me are given special notice in the leading journals of the country, thus bringing same widely before the public without cost to inventor.
REFERENCES: "Electrical Review," New York; Paul Cromelin, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. P. Newell, Manager and Secretary Water Works, Olympia, Oregon.
EDW. S. BUVALL, Solicitor of Patents. Loan and Trust Bldg., WASHINGTON, D. C.

A NEW AND VALUABLE BOOK.
"Gas, Gasoline and Oil Vapor Engines," by Gardner D. Hiscox, M. E. Octavo, cloth, 350 pp., 220 engravings. Price, $2.50. Sent, postage free, on receipt of price, by Electrical Review Publishing Company, 41 Park Row, New York city.
This, the only American book on the subject, is designed for the general information of every one interested in this type of motive power and its adaptation to the increasing demand for a cheap and easily managed motor requiring no licensed engineer. The book treats of the theory and practice of gas, gasoline and oil engines, as designed and manufactured in the United States. It also contains chapters on horseless vehicles, electric lighting, marine propulsion, etc. In view of the rapidly increasing interest in isolated plants operated by gas engines, this book should enjoy a large sale among electrical engineers. Address,
ELECTRICAL REVIEW,
41 PARK ROW, NEW YORK.

Wanted—An Idea Who can think of some simple thing to patent? Protect your ideas; they may bring you wealth. Write JOHN WEDDERBURN & CO., Patent Attorneys, Washington, D. C., for their $1,800 prize offer and list of two hundred inventions wanted.

HOUSE GOODS
ELECTRICAL SUPPLIES
OF ALL KINDS
WRITE FOR CATALOGUE
PARTRICK & CARTER CO.
123 S. 2D ST. PHILADELPHIA

WHITE-CROSBY COMPANY,
CONTRACTING ENGINEERS,
EQUITABLE BUILDING, BALTIMORE, MD.
New York Office, 29 Broadway.

No. 4 BULLS-EYE .. $12.00.
For 4x5 Pictures.
As Simple as a Pocket Kodak.
Loads in daylight with our light-proof Film Cartridges. Fitted with achromatic lens, improved shutter and set of three stops. Handsome finish.
EASTMAN KODAK COMPANY,
Booklet Free. Rochester, N. Y.

CLEARANCE SALE
OF
SHELF-WORN BOOKS

	List.	Net.
Atkinson. "Elements of Static Electricity"	$1 50	$0 60
Angell. "Elements of Magnetism and Electricity"	1 00	0 60
Benjamin. "Age of Electricity"	2 00	1 00
Bottone. "Electrical Instrument Making for Amateurs"	0 75	0 40
Bottone. "Electric Bells and All About Them"	0 50	0 40
Bottone. "A Guide to Electric Lighting"	0 75	0 40
Dolbear. "The Telephone, with Directions for Making"	0 50	0 30
Cumming. "Electricity Treated Experimentally"	1 50	0 50
Gordon. "School Electricity"	2 00	0 75
Fiske. "Electricity and Electrical Engineering"	2 50	1 00
Haskins. "Transformers: Theory, Practice and Application"	1 25	0 75
Houston. "Electrical Dictionary," old	——	1 00
Prindle. "Electric Railway of To-day"	0 50	0 25
Hamilton. "Origin of Energy"	2 00	0 75
Trevert. "Electricity and Its Recent Applications"	2 00	1 00
Slater. "Telegraphic Code"	3 00	1 00
Harris. "Rudimentary Magnetism"	1 80	0 80
Harris. "Rudimentary Electricity"	0 60	0 30
Munro. "Electricity and Its Uses"	1 40	1 00
Noad. "The Students' Text-Book of Electricity"	4 00	2 00
Kapp. "Alternate-Current Machinery"	0 50	0 30
Barnard. "First Steps in Electricity"	0 75	0 50
Stephen. "Wrinkles in Electric Lighting"	1 00	0 60
Richards. "Aluminum: Its Properties, Metallurgy and Alloys"	6 00	4 00
Dixon & Grier. "Vade Mecum." A valuable work of reference	2 50	1 50

Address
ELECTRICAL REVIEW,
Times Building, New York.

NON-ARCING AUTOMATIC CIRCUIT BREAKERS
GUARANTEED TO OPERATE PERFECTLY OR NO PAY. MADE FOR ALTERNATING OR DIRECT CURRENT. ANY VOLTAGE. CATALOGUE FREE.
AUTOMATIC CIRCUIT BREAKER COMPANY, NEWAYGO, MICHIGAN, U. S. A.